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## SUMMARY OF RECENT ABSTRACTS*

## III. MALARIA

### *Epidemiology*

PAMPANA (p. 425) sums up the history of malaria in Europe during the period 1938–47.

In Middelbourg, Holland, there was a relatively heavy incidence of malaria from 1940 to 1946, when *A. maculipennis atroparvus* was found breeding in cellars exposed by bombardment. DOELEMAN and VAN THIEL (p. 314) remark that this mosquito chose fresh water rather than saline water (which was quite near) for breeding, an unusual choice. The outbreak was probably due to the fact that many infected persons arrived in the town, and that German horses stabled there attracted mosquitoes.

Malaria in Germany is discussed by FISCHER (p. 426) and HOFFMANN (p. 426), who both regard *A. maculipennis messeae* as the important vector. Hoffmann writes about Upper Silesia, where the disease has been endemic for many years. KLOSE and EISENTRAUT (p. 426) report that during the war there were many prisoners-of-war, suffering from malaria, in Brandenburg. HORMANN (p. 696) also discusses malaria in Germany since the war.

BINCER (p. 999) discusses malaria in Poland, which has increased as a result of the war, partly because of the return of persons infected abroad, partly because war damage has led to increased breeding of the vector, *A. maculipennis messeae*.

Malaria due to *P. vivax* occurs in south-east Sweden and in south-west Finland; the vectors are probably one or more varieties of *A. maculipennis*. EKBLOM (p. 205) shows that incidence is declining, probably because of increased use of quinine, and improved social conditions. HERNBERG and TUOMELA (p. 205) show that in Finland during 1945 there were many cases of malaria which developed after long incubation periods, varying from 5 to 13 months. [See also JORDAN, below.]

CROSNIER *et al.* (p. 695) report cases of indigenous malaria in France, and CLÉMENT *et al.* (p. 112) describe malaria in two infants who had never been out of Paris. In Alsace and the Moselle country indigenous malaria was at one time prevalent, but has now disappeared. *A. maculipennis messeae* is still found, but CALLOT (p. 696) shows that in spite of the fact that malaria was imported during and after the war, there were very few locally transmitted infections.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1949, v. 46. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

SAUTET (p. 1103) reviews malaria in the south of France, where races of *A. maculipennis* occur and where infected immigrants increased the risk of transmission during the war. There is little chance of malaria becoming a serious menace.

Malaria incidence in Spain, where *P. vivax*, *P. falciparum* and *P. malariae* occur, is reported in tables compiled from figures sent in from the anti-malaria dispensaries of the provinces (*Rev. Sanidad e Hig. Pública*, p. 427).

JAUJOU and TOUMANOFF (p. 315) made a survey of Corsica, where spleen rates of 9–12 per cent., and parasite rates of 32–48 per cent. were found, and where *A. maculipennis labranchiae* and *A. sacharovi* were taken. *P. vivax* malaria occurs in Elba, where the only anopheline is *A. maculipennis labranchiae*; the incidence is not high, and BUONOMINI *et al.* (p. 315) hope to eradicate the disease by DDT residual spray and antilarval measures.

In the *Agro romano* a severe epidemic of malaria occurred in 1944, and JERACE (p. 427) states that it was due to war damage, suspension of control measures, introduction of new strains of parasites and other factors for which the war was responsible. By 1947 the outbreak had largely subsided, and the author attributes much of the success of the control campaign to the use of DDT, begun in 1944. The risk of spread of malaria in areas in which anophelines exist, and in which malaria is used as a treatment for neurosyphilis, is emphasized by BALZAR (p. 427), who quotes an instance of an outbreak in a town in Italy, near an institution at which malaria therapy was practised.

FOY *et al.* (p. 316) discuss the incidence of malaria and blackwater fever in Macedonia and Thrace in relation to the use of DDT on a large scale, which began in 1945. They found no evidence that DDT had contributed much to the remarkable reduction in malaria which took place in 1946.

ZOLTAI (p. 896) discusses the epidemiology of malaria in Hungary, where races of *A. maculipennis* are vectors in certain areas. Incidence rose during the war, and as a result of troop movements new strains were introduced and spread. Control measures against mosquito breeding, and the use of DDT, promise good results.

MALMEJAC (p. 897) reports an epidemic of malaria in Oran, which followed three years during which the incidence had been low. Abundant rain in spring created breeding places. Pernicious forms of both *P. falciparum* and *P. vivax* malaria were very prevalent.

A parasitological survey of African school children in Nairobi, of whom about one-quarter showed malaria parasites, is reported by ROBERTS (p. 432). The same author (p. 1104) reports his findings in blood examinations of hospital patients in Nairobi, Kenya, during the period 1939–44, which included an epidemic of malaria in 1940, transmitted by *A. gambiae*. In Nairobi he (p. 432) found that the degree of parasitaemia was no guide to the severity of malaria (chiefly *P. falciparum*). He studied the effect of malaria on the blood, in Europeans and Africans.

GARNHAM (pp. 898, 1114) discusses malaria at high altitudes, which is increasing in Kenya where *A. gambiae* and *A. funestus*, introduced from lower country, are responsible for transmission. He points out that these mosquitoes cannot breed if the mean atmospheric temperature is below 61°F. (which is the rule at 2,700 metres), and that a temperature of 64·4°F. is necessary for the development of *P. falciparum* in the mosquito. The latter temperature is rarely reached in the highlands, but African huts are usually at least 5°F. warmer than the open air, and *A. gambiae* and *A. funestus* spend most of their lives in human habitations. The use of DDT should be effective in control of high altitude malaria.

When certain swamps in Uganda were drained for cultivation there was a great increase in malaria. STEYN (p. 9) thinks that this was due to the increase of

breeding of *Anopheles christyi*, which favours ditches and water in paths through papyrus, but does not favour swamp or uncut papyrus. GARNHAM *et al.* (p. 10) report on malaria in this part of Uganda; they did not find evidence to incriminate *A. christyi*, but show that *A. funestus* and other species, including *A. gambiae*, were present. One-third of the infections found were due to *P. malariae*, and the association of this species with *A. funestus* has been noted before.

SCHWETZ (p. 428) describes malaria as he has seen it in the endemic areas of Central Africa, and notes that in the high plateaux epidemics may occur. SCHWETZ *et al.* (p. 897) report on a malaria survey of children in the Kwango district of the Belgian Congo, where parasites were found in 53 per cent., but not in high density. *P. falciparum* was common and *P. malariae* was present in a minority. In the Nepoko valley, Belgian Congo, which is at an altitude of 800 metres, malaria (chiefly *P. falciparum*) is claimed to be a very important cause of infant mortality, though it is a mild disease in adults. ZANETTI and LAMBRECHT (p. 601) show that although anopheline density is low, *A. gambiae* is found, and that the parasite index is low in comparison with other parts of the country. *P. malariae* is found occasionally.

DE MEIRA *et al.* (p. 208) describe the malaria position of the Cape Verde Islands. In Sal there are a few cases each year, in Boa Vista severe outbreaks occur at times, but in S. Nicolau the spleen index is low. *A. gambiae* and larvae of *A. pretoriensis* are reported.

JAFAR and IYENGAR (p. 109) surveyed the flat delta of Lower Bengal, where the spleen rate in children (November to February, 1945–46) was 34 per cent. The common parasite was *P. falciparum*, and the chief vector was *A. philippinensis*. The low, water-logged areas were comparatively free from malaria, which tends to confirm the opinion that a high subsoil water level acts as a deterrent to the breeding of *A. philippinensis*.

YACOB and SWAROOP (p. 6) have correlated rainfall with malaria in the Punjab, and have computed equations for forecasting epidemic incidence. SWAROOP (p. 697) discusses this forecasting of epidemics which has for many years been based on analysis of various factors, and which has achieved considerable success.

SWELLENGREBEL and SWELLENGREBEL (p. 602) discuss malaria in New Guinea, where the parasite response of the people approaches that of the hyperendemic areas of Africa, though the splenic response is not quite so characteristic. The difference probably reflects, not a racial characteristic, but rather the intensity of transmission.

HSU (p. 428) found malaria to be very prevalent in south-west Szechuan, China, where the spleen rate was 28 per cent. and where *A. hyrcanus* var. *sinensis* was the common anopheline, breeding in rice-fields, slow streams and pools.

FAUST and HEMPHILL (p. 603) show that malaria is steadily declining in the United States, and ANDREWS (p. 111) discusses this continued decline.

A malaria survey of the State of Veracruz, Mexico, is reported by BUSTOS CASTELLANOS *et al.* (p. 898), who remark that the disease is moderately prevalent, and that incidence is considerably less at altitudes of 1,000 metres than at lower levels. They give a list of the anophelines found, with comments on their breeding habits, distribution and importance in transmission. Malaria is not very widespread in north-east Mexico, but a control programme has been started (HERNÁNDEZ LIRA, p. 429).

In Santa Ana, El Salvador, malaria is reputed to be second or third in the list of causes of death. ZÚNIGA and AGUILAR RIVAS (p. 6) found a spleen rate of 19·7 per cent. *P. falciparum* appears to be the commonest parasite (in June) and *Anopheles albimanus* the vector.

GABALDON (p. 6) describes the malaria situation in Venezuela; it seems to be most prevalent on the plains, then (in order) the valleys, coastal districts and the south-east of the country.

A study of malaria in a district near Rio de Janeiro is reported by NETO *et al.* (p. 513).

*Transmission.*

Senior WHITE (p. 605) discusses malaria transmission in the light of evolution, noting that certain species of *Anopheles* transmit in one place but not in another. This fact may reflect differences of less than specific rank, which may be physiological. Races of insects have developed which are resistant to insecticides, not only those to which they have been exposed, and the author thinks that this may proceed so far as to compel us to abandon the use of insecticides, and to rely upon biological methods for insect control.

In a study of the factors which may affect the ability of certain mosquitoes to act as hosts for malaria parasites MICKS *et al.* (p. 335) found that there was no correlation between exflagellation and *p*H values, but that there appeared to be some chemical factor in the stomach of certain mosquitoes which provoked exflagellation and fertilization, and in others a factor which inhibited exflagellation.

SHUTE (p. 7) gives an account of the large group of *A. maculipennis atroparvus* used in the experiments on the human volunteer, which resulted in the discovery of the pre-erythrocytic forms of *P. vivax*. OLIFAN (p. 8) has studied the respiration of larvae of *A. maculipennis messeae* in relation to growth. There appears to be a rhythm of intensity of respiration, which is related to moulting. In Germany only *A. maculipennis atroparvus*, *A. m. messeae* and *A. m. maculipennis* are found; WEYER (p. 603) discusses their breeding habits and distribution. Much information is given in the original abstract. Anopheline mosquitoes are present in the whole coastal belt of the Gulf of Danzig. LACHMAJER (p. 1104) found *A. claviger* and three races of *A. maculipennis*. He describes their habits and breeding places. DEL VECCHIO & DEL VECCHIO (p. 8) name the anophelines identified during a survey of the province of Salerno, Italy. There was an evident association between *A. maculipennis labranchiae* and *A. sacharovi*, which breed in saline water along the coast, and malaria. SEPULCRI and MIRSA (p. 516) state that in the Venice area *A. maculipennis* hibernates from the end of October to the beginning of February. *A. hyrcanus* var. *pseudopictus* has been found near Venice, for the first time (SEPULCRI and MIRSA, p. 800).

BREINDL and KOMÁREK (p. 800) give a list of the anophelines of Czechoslovakia.

GAUD (p. 432) studied the behaviour of *A. maculipennis labranchiae* and *A. claviger*, in relation to altitude in Morocco. GAUD (p. 317) names the anophelines found in Morocco in 1947, and gives reasons for thinking that *A. sergenti*, which was very prevalent, may be a vector of malaria there.

LEESON (p. 516) reports on anopheline larvae taken in parts of Arabia which are little known. LEESON and THEODOR (p. 10) give a list of mosquitoes found in Socotra, which include varieties of *A. dthali* and *A. culicifacies*.

FARID (p. 516) points out that *A. gambiae* breeds in floating mats of the water plant *Potamogeton*, in the Nile, and the necessity for destruction of these mats, pieces of which may break away and float downstream. HOCKING and MACINNES (p. 209) have studied the bionomics of *A. gambiae* and *A. funestus* in East Africa. They show that *A. gambiae* tends to enter huts chiefly between 1 and 4 a.m., but that *A. funestus* does so at about 6 a.m. These mosquitoes do not usually spend more than 24 hours in one hut, but move from hut to hut; females do not rest in the bush in the daytime unless they have just emerged,

or just before and just after laying eggs. FERREIRA *et al.* (p. 1105) show that *A. gambiae* is the important vector in Portuguese Guinea, where the spleen rate in children is over 50 per cent., and the common parasite *P. falciparum*.

RANKINE (p. 516) reports *A. melas* from Mauritius, for the first time.

*A. stephensi* and *A. culicifacies* are the vectors at Fort Sandeman, Baluchistan (DE BURCA and JACOB, p. 11).

MACAN (p. 210) reports on an extensive wartime survey of the mosquitoes and malaria of the Kabaw and Kale valleys of Burma, where malaria is endemic and transmission takes place throughout the year, being intense from May to December. Seventeen species of *Anopheles* were recorded; *A. minimus* is the only vector in the dry season, but the important vector in the rainy season appeared to be *A. leucosphyrus* so far as the troops were concerned.

MCARTHUR (p. 1002) gives a list, and description of the habits, of the anopheline mosquitoes of Tambunan, N. Borneo, where *A. leucosphyrus* was the only vector of malaria. This mosquito breeds in seepages in dense jungle shade. The systematics of *A. leucosphyrus* and its varieties are discussed by REID (p. 1002).

VAN GOOR (p. 110) shows that relaxation of the anti-malaria measures in a province of the Netherlands East Indies resulted in increased breeding of *A. aconitus*, and a substantial rise in spleen rates.

MACKERRAS and LEMERLE (p. 1001) describe the conditions maintained for the breeding of *A. punctulatus punctulatus* on a large scale in Australia. Eggs were laid, 72 or 48 hours after a blood meal, hatched in 42 hours, the larval stage lasted 5–8 days, the pupal stage 30–40 hours, and adult females took the first blood meal two days after emergence. The life cycle from egg to egg thus occupied about 13 days. HORSFALL and PORTER in New Guinea (p. 1105) also record the length of the various stages of development of *A. punctulatus* and *A. farauti*, and describe their breeding places. Details should be sought in the original.

SANDOSHAM (p. 11) has written monographs on the common anophelines of Malaya and Thailand, with keys to larvae and adults.

DY and DEL ROSARIO (p. 517), for the first time, report breeding of *A. minimus flavirostris*, the generally accepted malaria vector, within the city of Manila. Various other species were collected in the city area. Sporozoites were found in the salivary glands of *A. mangyanus* by DY and GAPUZ (p. 518) in the Philippines; it was not certain that they were of human origin, but their presence is regarded as presumptive evidence that this species is a vector of human malaria.

The nocturnal activities of anopheline mosquitoes in Taiwan are recorded by OMORI (p. 900). One group showed activity just after sunset (*A. maculatus*, *A. annularis*, etc.), the second group showed activity about midnight (*A. minimus*, etc.), the third maintained sporadic activity throughout the night (*A. jeyporiensis* var. *candidiensis*). *A. annularis* is by far the most abundant species and for this reason is important in transmission of malaria.

*Anopheles hyrcanus* is widely distributed in Central Asia, breeding in swamps and rice-fields. GLAGOLEVA (p. 10) shows that its larvae tolerate more mineral and organic nitrogen than the larvae of other anophelines in the area; introduction of organic fertilizers killed the larvae of other anophelines, but not *A. hyrcanus*.

YAO (p. 602) has summarized the malaria situation of China, and constructed keys for all the 37 species and varieties of anophelines found.

Large-scale rearing of *A. quadrimaculatus*, for experimental purposes, is described by GREENWALD *et al.* (p. 111). BURGESS (p. 318) has crossed *A. quadrimaculatus* with *A. maculipennis freeborni*, but none of the resulting larvae survived beyond the third generation. *A. crucians* overwinters in the

aquatic stages in S. Carolina, *A. quadrimaculatus* does so as an inseminated female; *A. punctipennis* breeds throughout the winter (FROHNE and HART, p. 1002).

*A. aquasalis* and *A. argyritarsis* were found in Martinique by CAUBET *et al.* (p. 318).

PITTENDRIGH (p. 320) describes the Bromeliad plants of tropical America, which are closely concerned in the breeding of anophelines of the sub-genus *Kerteszia*. RACHOU *et al.* (p. 800) make the point that anophelines of the subgenus *Kerteszia* use for breeding the lower bromeliads, within 2 metres of the ground.

VAN DER KYP (p. 698) gives a list of *Anopheles* taken in Surinam.

*A. darlingi* and *A. albimanus* were the only two species found infected during a survey in Venezuela conducted by ANZOLA FALCON *et al.* (p. 12). The breeding of *A. albimanus* (a dangerous vector) and *A. pseudopunctipennis* (suspected) in Venezuela is an important factor in the incidence of malaria. BERTI and MONTESINOS (p. 211) discuss prevention of breeding, which entails the use of paris green and control of the cultivation of rice. PRATT (p. 318) has studied the variations in catches of *A. albimanus* in light traps, in relation to moonlight, and has compared them with catches made in animal traps. The latter probably give a truer conception of trends in anopheline populations. COVA-GARCIA (p. 210) contributes a note on *A. albimanus*.

TORANZOS (p. 1000) discusses malaria transmission in part of Brazil where the disease is rare. In north-east Brazil and in the Amazon region DEANE *et al.* (p. 319) found 36 species of *Anopheles*, but only *A. darlingi* and *A. aquasalis* are of real importance in malaria. *A. darlingi* breeds in fresh water and is the most domestic species, entering houses during the late hours of night; but it seems to prefer horses to man. *A. aquasalis* breeds usually in brackish water; it is less domestic than *A. darlingi* and is dangerous only when it is abundant. *A. albitarsis* was also found, one variety of which was probably a vector. One sporozoite infection of *A. pessoai* is also reported.

AMERICANO FREIRE and FARIA (p. 212) describe their technique of rearing *A. darlingi* in cages. DE ZULUETA and BATES (p. 517) report observations on the selection of sites for oviposition by *A. darlingi*.

BATES and DE ZULUETA (p. 698) have observed the seasonal cycle of anopheline mosquitoes in a pond in Colombia, in which several important vectors were breeding. They received the impression that factors affecting fluctuations of the mosquito populations operate in the adult rather than in the larval stage.

In Northern Chile *A. pseudopunctipennis* breeds in streams and feeds on filamentous algae; the latter flourish under certain conditions of water-flow, but die when the streams are seasonally reduced to small stagnant pools. NOE and MANN (p. 112) show that the mosquito breeding fluctuates with the state of the algae.

GORDON and CREWE (p. 514) show that after bites by mosquitoes there may be two types of reaction, an immediate allergic response in people who have been sensitized to substances in the mosquito saliva, and a delayed papular reaction which, they think, is due to a slow-acting toxin but not to sensitization. People long exposed to bites become desensitized or immune. The substances causing the allergic reaction are highly specific for the different mosquitoes.

### *Aetiology*

HUFF, and many other scientists who have worked on the problems of the exo-erythrocytic forms of malaria parasites, have published a series of papers in which their findings and opinions are embodied (p. 103). These six papers can hardly be abstracted further, and should be read in the original; they

include reviews and discussions of much previously published work. The papers relate to work in monkeys (HUFF and COULSTON), chemotherapy of the exo-erythrocytic forms in birds (COATNEY and COOPER; COULSTON and HUFF), tissue culture of exo-erythrocytic forms (PORTER), and the response of these forms to alterations in the life cycle of the species concerned (*P. gallinaceum*) (HAAS *et al.*).

HUFF (p. 317) has written an account of the problems relating to the exo-erythrocytic stages of malaria parasites, as they appeared before these forms were discovered in mammalian malaria.

An extensive review of knowledge of the development of malaria parasites in vertebrate hosts has been written by MUDROW-REICHENOW (p. 797), in which she traces the course of investigations in birds and mammals, leading to the discovery of the exo-erythrocytic forms in the liver cells of man.

In a paper published in 1945 SPANEDDA and FLORIS (p. 797) claim to have found exo-erythrocytic forms of human malaria parasites in sternal puncture material.

SAUNDERS *et al.* (p. 430) have succeeded in preserving *P. vivax* alive for 5 months by rapid freezing of defibrinated or citrated infected blood and keeping at −70°C. This process may be valuable in relation to induced malaria therapy.

BIJLMER and KRAAN (p. 317) show that the ability to produce gametocytes of *P. vivax* is a strain characteristic, but it declines in strains transmitted serially by syringe, in which the sexual cycle is eliminated.

MACKERRAS and ERCOLE (p. 429) have studied the development of *P. vivax* and *P. falciparum* in *A. punctulatus punctulatus*, and (p. 430) have attempted to assess the effect of factors which may influence infection. The discussion should be read in the original.

Whereas at 73°F. *P. vivax* takes 15–16 days, and *P. falciparum* 18–20 days to reach the stage of sporozoite infection of the salivary glands of *A. punctulatus punctulatus*, MACKERRAS and ERCOLE (p. 431) have found that *P. malariae* takes 31. In the blood of a man bitten by an infected mosquito, *P. malariae* appeared 24 days after the first bite, and symptoms began 2 weeks after that. The authors describe the morphology of the various stages.

PEEL and VAN HOOF (p. 7) have examined serum from the scarified skin of West African children with *P. falciparum* malaria, and have found in it parasites in more advanced stages than are usually seen in blood. Mature schizonts were quite common, and the authors think that the skin is the normal site of schizogony of *P. falciparum*; the picture in the skin resembles that in the placenta or deep organs.

BROUNST (p. 1109) reports a case of *P. ovale* infection in Beirut (Lebanon), but in comment GARNHAM remarks that the diagnosis of *P. ovale* from examination of a thick drop stained with Giemsa (as in this case) is open to criticism.

DELBOVE (p. 206) discusses the relative frequency of different species of malaria parasites in children in Indo-China.

WOLFF (p. 96) describes a simple rapid stain for malaria parasites.

### *Immunity*

An important paper has been published by BLACKBURN (p. 803) who studied tolerance and immunity to mosquito-induced *P. vivax* malaria in volunteers at Cairns, Australia. He distinguishes between tolerance (which is a state of low reaction to a given bulk of infection) and immunity (which is a state of ability to limit the bulk of infection developed), and he shows that tolerance is developed before immunity, that it is a response to trophozoite activity rather

than to activity of exo-erythrocytic forms, and that it is not necessarily strain-specific. On the other hand, anti-parasitic immunity appears to be strain-specific. Men who had developed complete tolerance and solid immunity were well, their spleens were not palpable, attacks of malaria could not be induced by chilling, etc., and they did not show gametocytes in the peripheral blood.

An important study of malaria in American service men who returned to the United States, and in other persons infected with strains from these men, is reported by YOUNG, EYLES and BURGESS (p. 322). Almost all the infections studied were with *P. vivax*, and they found that there was only slight heterologous immunity between *P. vivax* infections from the South Pacific, the Far East and the United States, though American Negroes were resistant to *P. vivax* from the Pacific and the Mediterranean areas. More relapses occurred with Pacific strains than with Mediterranean strains. American anophelines varied in their susceptibility to foreign strains of *P. vivax* ; *A. albimanus*, for instance, showed little susceptibility.

WINCKEL (p. 13) has investigated the histories of a large number of persons in whom malaria has been induced therapeutically in Holland. In these cases (mostly *P. vivax*) immunity frequently develops to such an extent that the paroxysms disappear and provocative methods fail to cause their return. Inoculation with other strains is unsatisfactory in such circumstances.

CIUCA *et al.* (pp. 321, 322) studied the reactions to induced malaria of patients from various parts of Rumania, and show that those from non-endemic areas were less resistant to *P. vivax* and *P. malariae* than those from endemic areas.

GARNHAM (p. 1113, 1114) describes his researches into the state of immunity to malaria of an African tribe in Kenya, where the disease is hyperendemic. He makes the point that infants and children are not often ill, though they are all infected within the first year of life. The resistance they show may be in-born, or the result of passive immunity transmitted from their mothers, or acquired [but it is unlikely to be only the acquired form]. He has found that in children of this tribe malaria is not so often a cause of death as it is thought to be, and he discusses the question of possible ill effects of incomplete control in hyperendemic areas.

DELBOVE (p. 206) discusses the state of premunition found in the Moïs of southern Indo-China, who live in the intensely malarious high plateaux. The spleen and parasite rates in children are much higher than in adults. The author remarks that the infant mortality rate due to malaria is high ; the commonest parasite is *P. falciparum*, but *P. vivax* and *P. malariae* are found. The same author (p. 207) makes the point that Tonkingese labourers brought into hyperendemic areas suffered severely from malaria, and though they slowly developed some resistance, this was never so effective as that of the Moïs. He (p. 207) thinks that the Moï infants of southern Indo-China possess an inherited resistance to *P. malariae*, which is not shared by immigrants from outside the hyperendemic area, and which is supplemented by premunition resulting from repeated infection. Adult Cambodians are usually robust and appear to suffer little disability from malaria, but DELBOVE and CAPPONI (p. 513) show that this is not due to the state of premunition which exists in the Moïs. Spleen rates and parasite rates of adult Cambodians show well-marked seasonal variation ; the people are not exposed to heavy infection throughout the year.

### *Pathology*

KNISELY *et al.* (p. 12) review their work on the " sludging " of blood, and in comment MAEGRAITH relates their findings to the pathology of malaria and trypanosomiasis, in which anoxia is a predominant feature. The paper should be read in full.

OVERMAN *et al.* (p. 801) have made detailed studies on the body fluids, the sodium, potassium and chloride content, and the plasma proteins, in induced *P. vivax* and *P. falciparum* malaria. These findings should be studied in the original. One general result was that they consider that the anaemia of malaria is due not only to blood destruction but also to dilution of the blood.

THONNARD-NEUMANN and STAHLMANN (p. 899) have investigated the invasion of reticulocytes by *P. vivax*. It seems clear that the parasites tend to attack reticulocytes more frequently than mature red cells, especially towards the end of the attack of malaria, and this may represent a reaction of the parasite against the defence forces of the host.

Inhibition of the activity of bone marrow, apparently the result of *P. falciparum* malaria, is reported by VAN DEN ENDE (p. 606). RILEY and ROBINS (p. 802) report a patient with *P. vivax* and *P. falciparum* infections in whom the sternal marrow showed a leukaemoid reaction, which terminated on treatment with mepacrine.

The reticulo-endothelial system as a whole, and in relation to malaria, is discussed at length by MARTINEZ MUJICA (p. 320).

### *Clinical Findings*

The danger inherent in the treatment of large numbers of patients with drugs by intravenous injection is illustrated by an outbreak of *P. falciparum* malaria in 28 of 189 patients attending a venereal diseases clinic in Lisbon. DE OLIVEIRA and FREIRE (p. 896) conclude that the source of infection was blood from a sailor with both malaria and syphilis, which apparently regurgitated into the syringe and thence contaminated the stock solution used for other patients. Six of the 28 died. BRUMPT (p. 999) also points out this danger of transmitting malaria in the course of treatment by injection, for instance of penicillin or arsenicals. Most of the *P. falciparum* infections actually acquired in France have probably been the result of syringe contamination.

BOVENTER (p. 799) has studied the behaviour of malaria parasites in citrated blood preserved at 37°C., 21°C. and 4°C. for periods up to 150 days. He describes the morphological changes which took place (more slowly at low temperature), and he succeeded in infecting volunteers with blood kept for up to 13 days (*P. vivax*) or 21 days (*P. falciparum*). MENK (p. 1002) and BOVENTER (p. 1002) discuss the risk of transferring malaria by blood transfusion. The latter points out that the period advised for storage of blood so that it is safe from the point of view of malaria is 3 weeks.

Prognosis in pernicious attacks of *P. falciparum* malaria is difficult, but BENHAMOU *et al.* (p. 903) find that the duration of coma before treatment is important, and the combination of high blood urea, coma and high parasite density is a grave omen. If the complement content of the blood falls to zero and remains there, early death is probable. In Malaya FIELD (p. 1107) found that parasite counts in untreated adult Asiatics are of great prognostic significance. He is doubtful whether serious *P. falciparum* infection can occur without parasites reaching the peripheral blood.

WALKER (p. 518) discusses the diagnosis of malaria, and the methods taught to students.

HARRIS and REIDEL (p. 527) used a complement-fixation test in malaria, in which the antigen was prepared from either *P. gallinaceum* or *P. knowlesi*. There was great variation in response to the test, but it was no substitute for examination of blood for parasites, for the presence of parasites was associated with both positive and negative tests. *P. gallinaceum* provided a more specific antigen than *P. knowlesi*, but very few false positive results were obtained with either, in non-malarial controls.

The complement-fixation test with an antigen prepared from *P. knowlesi* was positive in people infected with the St. Elizabeth strain of *P. vivax* about 7 days after parasites had appeared in the blood in the first attacks, and remained so for about 6 weeks in primary attacks, but much longer in repeated relapses. REIN *et al.* (p. 1107) state that this test may be useful in identifying recently subsided attacks, but not in diagnosis at an early stage.

KAHN (p. 900) discusses the universal serological reaction with lipid antigen, which shows considerable precipitation a month after malarial infection, returning to normal some 2 months later.

PEEL and VAN HOOF (p. 699) have examined the blood and the placentas of 403 parturient women in Léopoldville, where malaria is hyperendemic, *P. falciparum* predominating. In the placenta mature forms of *P. falciparum* are often present in large numbers. The authors examined 393 of the newly born infants, but failed to find parasites. Although congenital malaria is so rare, malaria in the mother appears to affect the health of the infant in that it is a cause of low birth-weight. LIMBOS (p. 14) discovered gametocytes of *P. falciparum* in the blood of a West African child within 24 hours of birth, which strongly suggest intra-uterine malaria. COLUZZI (p. 1108) reports several cases of congenital *P. vivax* malaria. A case of congenital *P. vivax* infection is reported by CHUNG *et al.* (p. 434).

JORDAN (p. 15) reports a primary attack of *P. vivax* malaria 27 months after infection, in an American soldier who was taking suppressive mepacrine at the time when infection presumably occurred. HANNS and MUGLER (p. 113) report prolonged latent periods in men who had been prisoners in Russia, and in whom malaria occurred after repatriation to France. In such cases the diagnosis is often difficult.

As a result of the study of soldiers infected in Sardinia, v. HALLER (p. 605) thinks that *P. vivax* malaria rarely relapses 1½ years after the last infection, and that the infection is usually gone within 2 years. In malaria induced by blood inoculation relapses are rare after 2 months. In *P. falciparum* malaria the infection rarely persists for a year, and relapses do not occur after a latent period of 8 weeks. v. HALLER (p. 1004) puts the limit of symptoms due to *P. vivax* at 18 months after infection ; *P. falciparum* does not reappear if a thick drop is negative after 8 weeks of freedom from fever.

DE GRAAF (p. 901) observed the course of malaria, and its relapses, in a large number of patients in a prisoner-of-war camp in Batavia. Most relapses in *P. falciparum* infections took place within 4 weeks, and none after 9 weeks ; in *P. vivax* 93 per cent. occurred within 2 months, there was no peak of relapses at 7 months (as observed by JAMES), and no patient continued to have parasites in the blood, or to relapse, for more than a year and a half.

Observations on malaria in war refugees arriving in Rome in 1945 are reported by BOSCARDI and CORSI (p. 513).

MOHAPATRA (p. 433) describes cerebral symptoms in an Indian child, which he ascribes to *P. vivax* infection.

BRUCKNER and LĂZĂRESCU (p. 903) report two cases of *P. falciparum* malaria in which there were encephalitic features.

RAYNAUD *et al.* (p. 902) refer to malarial meningitis, which is rare but which is usually associated with *P. falciparum* infection. They describe the symptoms and report a case in which quinine effected rapid recovery. The cerebrospinal fluid was clear.

STRANSKY (p. 1003) describes pernicious attacks of *P. falciparum* malaria in children in the Philippine Islands.

Malarial pneumonia is described by HEILIG and SHARMA (p. 114) ; administration of sulphonamides was not useful, but anti-malaria therapy produced rapid improvement.

The acid secretion of the stomach is apparently diminished in chronic malaria with enlargement of spleen and liver (LIPPI, p. 321).

*P. falciparum* malaria simulating acute appendicitis is reported by MORALES *et al.* (p. 1108).

ROBERTS (p. 606) reports dysentery which occurred in the course of an epidemic of malaria, and which he attributes to malaria.

CERABONA (p. 519) considers that malaria may be a direct cause of nephritis.

MASSIAS and HAO (p. 433) connect the ascites which they commonly see in Indo-China, with malaria, but admit that nutritional factors may be involved.

KISSIN and ADLEMAN (p. 519) describe 5 cases of transient urticaria in malaria.

MARCHIONNI (p. 113) describes a case of spontaneous rupture of a malarial spleen.

CSEH FIRTOS (p. 1108) discusses malaria in psychiatric patients at an institution in Holland. *Charles Wilcocks*

[*To be continued*]

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## MALARIA

SCHWETZ, J., BAUMANN, H. & FORT, M. Contribution à l'étude du paludisme endémique dans le district du Kwango. Quatrième étude. Sur le paludisme des villages de la Lukula supérieure. Avec des considérations générales sur la problème paludéen dans le Kwango. [**Fourth Contribution to the Study of Endemic Malaria in the Kwango District: Malaria in the Villages along the Upper Lukula. Some General Considerations on the Malaria Problem in the Kwango.**] *Ann. Soc. Belge de Méd. Trop.* 1949, June 30, v. 29, No. 2, 191–205.

The authors report on the examination of 90 thick drop and thin blood smears taken from the inhabitants of 14 villages on the banks of the upper Lukula River, Belgian Congo. Taken together the results present a picture of hyperendemic malaria but much more information than is available would be necessary to support definite conclusions [see also this *Bulletin*, 1949, v. 46, 897].

The Kwango District is vast, extending from 3° to 8°S. and comprises very diverse geo-botanic regions. Numerous large rivers traverse it from south to north. The fragmentary information available shows a corresponding diversity in the anopheline fauna. Along the Lower Kwango are found *Anopheles moucheti*, *A. gambiae*, *A. ziemanni*, *A. paludis*, *A. obscurus* and *A. nili*; the first very common, the others rare, except *A. paludis*. Along the Middle and Upper Kwango *A. gambiae* (very common), *A. funestus* (rare), *A. moucheti*, *A. obscurus*, *A. paludis*, *A. nili* and *A. pretoriensis*, all very rare. In the valley of the Wamba two new species *A. dureni* and *A. concolor* were discovered. Elsewhere the anopheline fauna has not been studied.

In the Kwango there are areas with little malaria as well as hyperendemic areas; areas in which the three species of plasmodia are plentiful and others in which *P. falciparum* is predominant, with a certain percentage of *P. malariae*; but there is much more to learn. *Norman White*

WILSON, T. & REID, J. A. **Malaria among Prisoners of War in Siam ("F" Force).** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Nov., v. 43, No. 3, 257–72, 2 figs. & 1 map.

In April 1943 a party of 7,000 British and Australian prisoners of war were sent by the Japanese from the camp at Changi, Singapore Island, to work on the construction of the railway designed to link Bangkok with Moulmein. The authors of this paper were attached to the force as advisers on malaria and nutrition. They tell the story of the malaria experience of this force which from May to November was working along a 45-mile stretch of the railway from the Three Pagodas Pass, on the watershed dividing Burma from Siam, south-east along the valley of the Me Nam Kwa Noi. The force was practically free from malaria when it left Changi. Most of the survivors were back in Changi in December 1943. The malaria parasite rate of the 3,122 who returned was 25·7 per cent. and the malaria attack rate during 7 weeks of January and February 1944 was 18·8 per thousand men per day. Of the 7,000 men who had left Changi in April 1943, 3,087 died during the subsequent 12 months; the chief causes of death were malnutrition, beriberi, dysentery and diarrhoea, cholera, malaria, and tropical ulcers. Malaria was the sole cause in 4 per cent. of the deaths, but it was also an important contributory cause of death in very many other cases.

The malaria conditions in five of the six camps in which the men were sheltered along the railway track are described, and considering the conditions in which the work was carried out, and the paucity of equipment, a surprisingly large amount of information is forthcoming. *Plasmodium vivax* was throughout the predominant species of parasite, especially in the later months when the conditions were those of relapsing *P. vivax* malaria in a debilitated population.

*Anopheles maculatus* and *A. minimus* appeared to be the principal vectors; *A. leucosphyrus* was also a probable vector. These conclusions were based on larval surveys alone. The anopheline larvae found included *A. aitkeni*, *A. barbumbrosus*, *A. kochi*, *A. leucosphyrus*, *A. maculatus*, *A. minimus*, *A. vagus*. [The authors state that *A. aitkeni* and *A. barbumbrosus* do not appear to have been reported from Siam before. As a matter of fact both were reported by SANDOSHAM (this *Bulletin*, 1949, v. 46, 11). SANDOSHAM also reported the occurrence in Siam of *A. jamesi*, *A. insulaeflorum*, and *A. gigas*, which species do not figure in the complete list of Siamese *Anopheles* recorded by the authors of the present paper.] *Norman White*

PANTHIER, R. Impaludation primaire de sujets adultes, transplantés en zone d'endémicité et d'hyperendémicité palustre. [**Primary Malaria Infections of Adults transported to Endemic or Hyperendemic Malarial Regions.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 3/4, 97–100.

A study was made of more than 2,000 primary infections of malaria among persons recently arrived from a non-malarious region to parts of Indo-China where malaria is hyperendemic. About half of these infections were due to *P. vivax*, half to *P. falciparum*. *P. malariae* infections amounted to only 0·2 per cent., although among the indigenous population the incidence of *P. malariae* infections was in no place lower than 6 to 10 per cent. The author suggests an explanation of this phenomenon. Sporozoites develop in reticulo-endothelial cells. If sporozoites of two or more species of malaria parasites are inoculated simultaneously into a wholely susceptible person the predominant species will be the one with the shortest life-cycle.

An analogous form of interference has been observed by the author in the study of influenza virus cultivated at 35°C. in the hen's egg. The virus undergoes intracellular cycles of evolution. A strain of virus such as A(PR8) with

an evolutionary cycle of never more than 9 hours constantly predominates over the B(Lee) strain, for example, of which the maximum evolutionary cycle is 12 hours. *Norman White*

SWELLENGREBEL, N. H. **Stages in the Development of Collective Immunity in Malaria.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1949, June, v. 1, No. 2, 165–74, 9 graphs & 1 map.

Collective immunity is the adjustment of the hosts to the parasites, that develops in a population exposed to perennial infection with malaria. For its determination the age group is the unit of observation : in the younger groups the immunity is growing. " Collective immunity in some communities grows stronger than in others. Placed side by side they form an ascending scale ; each community represents one of the ' stages in the development of collective immunity in malaria'. " Hence the title of this paper.

The author presents relevant data for a number of places in New Guinea and compares them with other Indonesian observations. The results are then correlated with the views of Bagster WILSON & WILSON [this *Bulletin*, 1937, v. 34, 579]. For all places the spleen rate, the parasite rate, and the heavy-infection rate (persons with at least one parasite per ten leucocytes) are recorded for each age group. The New Guinea records contain examples of all stages from almost negligible collective immunity (low and fairly uniform spleen and parasite rates) to a higher degree of collective immunity than any known in Western Indonesia. ' New Guinea is the most malarious island in the Malay Archipelago.

In villages on the shore of Jautefa Bay, New Guinea, the spleen rate falls from round about 80 per cent. in children to about 40 per cent. in adults : the spleen rates follow the parasite rates in this downward trend, keeping always just above them. The incidence of *P. vivax* falls from 33 per cent. in children to 13 per cent. in adults : the incidence of crescents from 10 per cent. in young children to 2 per cent. in older children and to nil in adults. These conditions resemble those found among the Bantu of the North-eastern Transvaal and Northern Zululand. No stage of collective immunity hitherto found in New Guinea attains to the level of that of the Digo type recorded by the WILSONS. The contention of SCHÜFFNER *et al.* [this *Bulletin*, 1932, v. 29, 693] that the ability to reach the highest stage of collective immunity is a hereditary character has still to be disproved. *Norman White*

SHORTT, H. E., FAIRLEY, N. H., COVELL, G., SHUTE, P. G. & GARNHAM, P. C. C. **The Pre-Erythrocytic Stage of *Plasmodium falciparum*. A Preliminary Note.** *Brit. Med. J.* 1949, Nov. 5, 1006–8, 3 figs.

The first impulse for the search of an exoerythrocytic phase in the life-cycle of the human malaria parasites—which has been going on for some years—was given by the discovery in a number of species of avian *Plasmodium* of developmental stages outside the red blood corpuscles. Circumstantial evidence of the existence of such a tissue phase in man was furnished by FAIRLEY's demonstration of a negative period intervening between the inoculation of the sporozoites and the appearance of parasites in the blood [this *Bulletin*, 1945, v. 42, 630], while GARNHAM's detection of the exoerythrocytic development of *P.* (now *Hepatocystes*) *kochi* in the liver of its simian host [*ibid.*, 1948, v. 45, 683] provided an important clue to its possible localization. By following this clue, SHORTT and his collaborators succeeded in demonstrating experimentally pre-erythrocytic stages in the malaria parasites of other Primates : first in *P. cynomolgi* of macaque monkeys [*ibid.*, 1948, v. 45, 762] then in *P. vivax*

[*ibid.*, 1948, v. 45, 482], and now in *P. falciparum*. In all these species, the pre-erythrocytic development of the parasite takes place in the parenchyma cells of the liver. The successful termination of the quest—in which others working on the same problem had failed—was largely due to the employment by SHORTT's team of shock tactics, *viz.*, the inoculation of volunteers with massive doses of sporozoites, far in excess of the number to which human beings are ever exposed under natural conditions.

The experiments with the malignant tertian parasite were carried out as follows. Numerous mosquitoes of the species *Anopheles maculipennis atroparvus* and *A. quadrimaculatus* were infected from a patient harbouring abundant gametocytes of *P. falciparum*. After fourteen days it was established that the infection rate was 93 per cent. and the salivary glands were heavily parasitized. Mosquitoes were allowed to feed on a volunteer three days in succession, in the course of which a total of 770 bites was recorded.

The results of the experiments were assessed by biopsy of the liver 140 hours after the initial feed of the mosquitoes, when it was expected that pre-erythrocytic forms of the parasite would be at three stages of development separated by intervals of 24 hours. The material was fixed with Carnoy's fluid and sections were stained by the colophonium-Giemsa method. Examination of the liver sections revealed three stages of pre-erythrocytic schizonts within the parenchyma cells. The shape of the schizonts was ovoid or lobose, the 4-day-old form measuring about $31 \times 26 \mu$, the 5-day-old form about $50 \times 36 \mu$, and the 6-day-old one up to $60 \mu$ or more by about $30 \mu$. The number of nuclei increased with the age of the schizonts, which in the oldest stages (140 hours) were in process of segmentation, some of them already releasing small merozoites (about $0{\cdot}7 \mu$ across) into the surrounding sinusoids.

In some cases an apparent membrane was present around the schizonts but there was no cellular reaction to the presence of the parasites in the liver tissue. The three stages are shown in the text figures.

The pre-erythrocytic forms of *P. falciparum* are similar to those of *P. cynomolgi* and *P. vivax*, but in the first-named species the mature schizont is larger while the merozoites are smaller and more numerous. Furthermore its schizogony proceeds more rapidly than in the two last-named species. The similarity of the life-cycle in the three species also indicates that they are closely related to each other.

*C. A. Hoare*

KAHN, M. C. & OFFENHAUSER, W., JR. **The First Field Tests of Recorded Mosquito Sounds used for Mosquito Destruction.** *Amer. J. Trop. Med.* 1949, Sept., v. 29, No. 5, 811–25, 6 figs.

The early literature on attraction of mosquitoes by sound is reviewed and it appears that observations on the subject date from about 1900. The present authors, believing that the exact nature of the sounds emitted by female mosquitoes are not known, have relied upon gramophone recordings of the notes emitted by single females of various species. Laboratory tests indicated that corresponding males could be readily attracted by these sounds.

For the field tests, a recording was made of the note emitted by females of *Anopheles albimanus*; the sound ran for seven seconds and was followed by five seconds' silence. Sufficient repetitions were recorded electrically to fill up a 12-inch disc. The record was played at different degrees of amplification until the optimum (for attracting large numbers) was discovered. This was about ten volume units as measured on an American Standard Electric Volume Indicating Meter (Weston Model 862).

Surrounding the loudspeaker was an electrified cage with wires spaced $\frac{3}{8}$ inch apart. This was charged electrically with a potential which would

electrocute the insects without burning them (unfortunately this potential was dangerous to man and animals). The loudspeaker and cage were set up near a swamp in Cuba and observed over a number of evenings. Contact of insects with the grid gave a spark, so that the numbers of contacts per five-minute period could be recorded. It was found that the maximum occurred about 15 minutes after sunset, and numbers tailed off on either side of this point. Numbers varied enormously from night to night and these data were best recorded in percentages of the maximum period for each night.

Under the charged grid, a sheet was spread to catch the electrocuted insects. The majority were mosquitoes (though no exact figures are given) and of the mosquitoes, 68 per cent. were *A. albimanus* males ; these males were 91 per cent. of all *A. albimanus* caught. Most of the mosquitoes were electrocuted on the front of the wire cage, but some were killed on the sides, and even on the top 6 ft. high (*e.g.*, over a peak period of 20 minutes ; 183 on front, 54 on top, 56 on left side, 91 on right side). A " typical catch " of other insects electrocuted was 10 moths, six aphids, three beetles and a few wasps.

*J. R. Busvine*

Kahn, M. C. & Offenhauser, W., Jr. **The Identification of certain West African Mosquitoes by Sound.** *Amer. J. Trop. Med.* 1949, Sept., v. 29, No. 5, 827–36, 3 figs.

Fifteen recordings were made of different African mosquitoes, either as separate sexes or together. The apparatus used and the necessary sound insulation (to exclude extraneous noises) are described in some detail.

To detect and record the wave lengths of dominant and secondary frequencies two methods were adopted ; one was by use of the human ear and the other by a mechanical method. In the human method, the amplified sound was emitted in one microphone of a pair of earphones, while the other was connected with an apparatus giving a variable pitch note which was then matched with the natural sound. The purely mechanical method employed an expensive apparatus developed by the Bell Telephone Laboratories Inc. for recording sound spectrograms.

The following conclusions were reached in this study :—

1. All mosquito sounds are composed of a well-defined fundamental, in the centre of the audio range, together with overtones. In some spectrograms as many as 15 distinct frequency bands are recognizable.

2. All mosquito sounds have vibrato effects. Some species show tones with a single warble note ; others show double warble modulation. A common rate for the low frequency warble is from 2 to 15 cycles per second ; the higher rate, when present, is often 5 times the lower. The magnitude of the lower rate is 5 to 10 per cent. ; the higher rate is about one-fifth to one-tenth the lower.

3. Male sounds are usually more broken than those of the female. In most species the apparent pitch of the male is higher than that of the female, despite but a small difference in their fundamentals. Mosquito sounds show a change of pitch with time ; some increasing as much as 25 per cent. in 0·05 seconds.

4. The intensity is modulated in all sounds. In some cases modulation is a complete interruption of an entire band or bands ; in others, harmonics only are varied leaving the remainder unaffected.

*J. R. Busvine*

Bernet, J. Contribution à l'étude des conditions du paludisme à Dakar et la presqu'ile du Cap Vert. [**Malaria Conditions in Dakar and the Cape Verde Peninsula.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1948, v. 5, No. 2, 361–78.

In Dakar outbreaks of malaria occur in September, October and November, but transmission may occur at any time of the year. August and September

is the rainy season. Two species of *Anopheles* are found in Dakar, *A. gambiae* and *A. pharoensis*: the former is the vector. The author describes the habits of *A. gambiae* and concludes that malaria infections that are from time to time contracted by persons who have not left the town are most likely to have been transmitted by mosquitoes bred in the near vicinity. A formidable list of potential breeding places for *A. gambiae* in the various quarters of the town is given, and suggestions are made as to how they might be eliminated or rendered harmless. *Norman White*

RIBBANDS, C. R. **The Duration of the Aquatic Stages of *Anopheles minimus*, Theo., determined by a New Method.** *Bull. Entom. Res.* 1949, Dec., v. 40, Pt. 3, 371–7, 4 figs.

The author had previously demonstrated in West Africa the occurrence of regular fluctuations in the numbers of *Anopheles melas* with peaks every eight days [this *Bulletin*, 1945, v. 42, 245]; he considered that the intervals between peaks were equal to the time taken to complete a full life-cycle. In this paper he gives an account of a similar study of the fluctuations which occur in the numbers of adults and larvae of *A. minimus* in Assam and of the simple statistical methods which he applied to the data obtained.

Along the course of the Hapjan river a stretch of 100 feet was marked off in lengths of one foot. On sixty-one mornings during May, June and July, 1945, one dip per foot was made and the *A. minimus* pupae and larvae of each instar were counted, recorded and returned to the water.

Inspection of the daily records showed that the peaks in the three-day running means of the various instars followed in definite sequences and analysis of the sequences indicated that the peaks were not distributed at random and suggested that under the observed conditions the larval stage of *A. minimus* occupied approximately seven days and the pupal stage two days.

Records of catches of adult *A. minimus* made nearby showed three peaks during the period of the larval observations and when the two sets of figures were compared it was seen that the three aquatic sequences which were followed by the adult peaks were followed seven days later by first instar peaks.

Enough data were collected to suggest, if not to prove, that the life cycle of *A. minimus* under monsoon conditions in Assam took 14 days as follows: egg stage, 2 days; larval stage 7 days; pupal stage 2 days; leaving 3 days for the period between adult emergence and egg laying. *H. S. Leeson*

SABROSKY, C. W. **Occurrence of Malaria Mosquitoes in Southern Michigan.** *Tech. Bull. Michigan Agric. Exper. Station.* 1946, No. 202, 50 pp., 2 maps. [14 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1949, Oct., v. 37, Pt. 10, 199.]

In pioneer days, Michigan was regarded as highly malarious. In recent times, there have been only about 70 scattered cases per year, but this incidence, together with the return of service-men from infected areas, is deemed to constitute a constant threat. Larval and adult Anopheline surveys were therefore made in southern Michigan in 1943 and are described in this bulletin. The 951 adults collected and identified included examples of the four Anophelines (*Anopheles quadrimaculatus*, Say, *A. punctipennis*, Say, *A. walkeri*, Theo., and *A. maculipennis occidentalis*, D. & K.) known to occur in the State. Immature stages were found in 419 of the 624 stations searched, and 4,907 of the 7,276 larvae and pupae counted in the field were identified. *A. quadrimaculatus* was found to be breeding in a great variety of situations in both standing and running water, though with a preference for the former. It was collected from 352 of the 419

positive stations and formed 75·09 per cent. of the total identified. *A. punctipennis* formed 19·97 per cent. and showed a preference for running waters, but even in these it was not always more plentiful or widespread than *A. quadrimaculatus*. *A. walkeri* appeared to be numerically unimportant, but because its larvae may be thinly scattered over large areas of marsh or swamp, the samples probably do not give an accurate indication of its relative abundance. *A. m. occidentalis*, a northern form, was not taken in larval collections ; it was represented by a few adults only. Keys for the separation of the larvae and adults of the four Anophelines and the pupae of all except *A. m. occidentalis* are appended.

Rachou, R. G., Neto, J. A. F. & Martins, C. M. Alguns dados relativos à densidade de anofelinos do sub-gênero *Kerteszia*, em duas matas de Brusque (Santa Catarina). [**Density of Anophelines of the Sub-Genus *Kerteszia* in Two Woods in Brusque (Santa Catarina) Brazil.**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1949, Apr., v. 1, No. 2, 113–27.

This paper consists mostly of tables setting out in detail the results of a survey of anophelines of the subgenus *Kerteszia* which occur in two woods in Brusque. These woods are representative of the forests in the bromeliad malaria zone in the valley of the river Itajai, and were chosen for the experimental application of insecticides from a helicopter.

The survey was made in 1944 and 1945 and the species collected were *Anopheles* (*K.*) *cruzii* which was the commonest, and *A.* (*K.*) *bellator* which was very rare.

The authors refer to the unreliability of conclusions based on the "larval density per bromeliad found positive" and show how erroneous such conclusions could be. The most reliable criteria are (*a*) the percentage of bromeliads found to contain anopheline larvae, *i.e.*, the "larval index" and (*b*) the "larval density" per bromeliad *examined*. In the Maluche wood the larval index was greatest in the bromeliads over 5 metres from the ground and in Torre wood in those between 2 and 5 metres. These results differ from those obtained in other localities where the bromeliads at the lowest levels were the most frequented and richest in larvae. [See this *Bulletin*, 1949, v. 46, 800.]

The numbers of adults of these anophelines in collections from traps with human baits were greater than those from traps with animal baits ; in Maluche the mean figures per collection were 53·90 and 7·16, and in Torre Wood they were 79·59 and 24·87 respectively. It was also shown that horse was a more attractive bait than goat as collections of anophelines from horse-bait traps averaged 7·57 and those from goat-bait traps 1·25, a proportion of six to one which corroborated results obtained in Cacupé Pequeno. Figures are also given which show that in both woods the majority of the mosquitoes taken in the traps were collected from the open portions ; only 17·37 per cent. being taken in the sheltered portion. *H. S. Leeson*

Maegraith, B. G., Andrews, W. H. H. & Wenyon, C. E. M. **Studies on the Liver Circulation. I. Active Constriction of the Hepatic Venous Tree in Anaphylactic Shock.** *Ann. Trop. Med. & Parasit.* 1949, Oct., v. 43, No. 2, 225–8, 2 figs. on pl. [23 refs.]

Anaphylactic shock results in a marked drop in the venous outflow from the liver of the dog. Various explanations have been advanced to account for this ; Bauer *et al.* (Bauer, Dale, Poulsson & Richards, *J. Physiology*, 1932, v. 74, 343) described a sphincter mechanism at the caval ostia of the hepatic veins in

the dog, which they held to be responsible for the phenomenon ; Weil (*J. Immunology*, 1917, v. 2, 525) on the other hand performed experiments the results of which suggest that the whole of the hepatic venous tree in the dog constricts as a result of shock.

A dog was sensitized to horse serum ; three weeks later a small injection of this serum into the liver substance immediately produced a localized congestion and swelling which lasted about an hour. Another similar injection into the same area then caused no reaction. Serum introduced into a branch of the portal vein supplying this lobe then caused congestion of the whole of it including the original area ; and finally an intravenous injection of a large amount of serum resulted in congestion of the whole liver. This experiment demonstrated initially a local constriction of small veins, this area then becoming desensitized ; the congestion of the lobe after a subsequent intraportal injection was due to constriction of larger tributaries, and so obstruction to the venous outflow from the lobe ; while the intravenous injection caused constriction of all the large tributaries and probably also of the sphincters at the caval ostia. The livers of sensitized rats, guineapigs and rabbits reacted much less constantly and less vigorously to locally injected antigen than did those of the dog, while non-sensitized control animals failed to react.

In further experiments a small amount of antigen was injected into the exposed livers of dogs and of guineapigs, and three weeks later a " trigger dose " of serum was given intravenously ; the whole liver was found to be sensitized and to give the responses described above.

The authors consider that this work proves that constriction of both large and of small radicles of the hepatic vein can be produced by anaphylactic shock, and that the constriction brings about a fall in hepatic venous outflow. The venous obstruction is responsible for congestion of the liver substance which is essentially centrilobular in distribution and this, they conclude, is the causative mechanism in the centrilobular lesions they have demonstrated in many conditions [this *Bulletin*, 1948, v. 45, 234, and 1949, v. 46, 180].

*A. R. D. Adams*

Andrews, W. H. H., Maegraith, B. G. & Wenyon, C. E. M. **Studies on the Liver Circulation. II. The Micro-Anatomy of the Hepatic Circulation.** *Ann. Trop. Med. & Parasit.* 1949, Oct., v. 43, No. 2, 229–37, 2 diagrams (1 coloured on pl.) & 9 figs. on 2 pls. [39 refs.]

There has been conflict of opinion on the micro-anatomy of the hepatic circulation. After a review of the literature on the subject the authors describe the methods they adopted to clarify the position. Human, dog, cat, rabbit, guineapig and rat livers were perfused either during life or after death through the portal system, the hepatic arterial or venous systems, or the bile ducts with one or other of a number of compounds ; subsequently the livers were either sectioned or dissolved in commercial hydrochloric acid. The substances injected were Indian ink, neoprene, hycar latex, coloured gelatin, or a suspension of kieselguhr. [For details of the technique the original must be consulted.] By this means the ramifications of the portal vein, of the hepatic artery and vein, and of the vessels around the bile duct and gall bladder were traced. The detailed findings must be sought in the original in which a number of excellent illustrations, photographs and photomicrographs illuminate the conclusions. The authors conclude with the following summary :—

" The portal tracts are surrounded by a network of large sinusoids, into which run branches from the portal vein and hepatic artery. Other sinusoids radiate from this network into the lobules.

" The portal vein sends branches to the lobule via this periportal network. It is also connected by short vessels to a plexus which is present on the bile-ducts.

" The hepatic artery supplies the tissues of the portal tract, and sends branches to the periportal network. There is some arterial anastomosis, especially on the surface of the liver.

" The point at which hepatic arterial blood is mixed with portal venous blood is probably immediately around the portal tract.

" The bile-duct is surrounded by a plexus which receives branches from the portal vein and the hepatic artery. The drainage of this plexus is into the sinusoids.

" Sinusoids drain directly into small central veins. The sublobular veins may receive sinusoids direct, but the sinusoids more usually gather into short trunks, which then run into the veins." *A. R. D. Adams*

KNÜTGEN, H. Knochenmarksbefunde bei Malaria tertiana. [**The Bone-Marrow in Benign Tertian Malaria.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Aug., v. 1, No. 2, 178–94, 1 chart. [30 refs.]

The observations described in this paper were undertaken with the object of studying the morphology and functional pathology of the bone-marrow and elucidating the nature of anaemia in *vivax* malaria. Of the 37 patients examined before and during treatment, the majority represented relapse cases, while nine were primary infections in the first latent period. The material removed by sternal puncture was spread in thin and thick smears, and stained by Pappenheim's method.

The results which are set forth in a table, were as follows. Myelopoiesis was characterized by a preponderance of metamyelocytes and young unsegmented polymorphonuclears, while mature unsegmented and segmented forms were scanty. As the result of inhibition of the maturation of granulocytes at the metamyelocyte and unsegmented polymorph stages, the leucocyte count in the peripheral blood was low. Phagocytosis of malarial pigment by granulocytes did not take place. The reticulo-endothelial system was in a state of stimulation, resulting in increased activity manifested by phagocytosis of pigment by monocytes and macrophages. Both this function and certain morphological features indicated that the monocytes of the bone-marrow and the macrophages of the reticulo-endothelial system originate by differentiation from the same type of parent-cell. Phagocytosed parasites have not been observed, either in untreated or in treated cases. There was a marked increase in erythropoiesis, with a predominance of megaloblasts and basophilic cells indicating an inhibition of the maturation process. Neither megaloblasts nor normoblasts have been found harbouring parasites. The parasites found in the bone-marrow did not differ in any way in behaviour or distribution from those in the peripheral blood. When the blood became negative after drug treatment, the parasites also disappeared from the bone-marrow but the continued presence of pigment in the macrophages provided a clue to the diagnosis. *C. A. Hoare*

VAN LAWICK VAN PABST, M. H. **Congenital Malaria.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1949, June, v. 1, No. 2, 131–3.

The author, a gynaecologist, records two cases of congenital malaria, one due to *P. falciparum*, the other to *P. vivax*. In both cases parasites were found in the blood of the umbilical cord and in the peripheral blood of the infant immediately after birth.

Most writers on congenital malaria have assumed that haemorrhages, infarcts or some lesion of the placenta have resulted in open circulation between mother and foetus, thus facilitating the transfer of infection. The author gives reasons for believing this conception to be erroneous: the breaking down of the placental barrier is much more likely to be caused by the active movements and special characteristics of the sporozoites: research on these lines in animals might be productive. The two cases described were both instances of a pregnant woman who had never before suffered from malaria and who was infected during pregnancy.

With regard to treatment, there is no valid reason for believing that quinine therapy induces abortion: a pregnant woman can safely take quinine in therapeutic doses. *Norman White*

NANDI, A. K. **Unusual Manifestations of Malaria.** *Brit. Med. J.* 1949, Dec. 3, 1272–3.

Clinical notes are given of five patients suffering from malaria, all of whom presented unusual symptoms.

A healthy looking boy aged 12 suddenly fell down unconscious. An hour later he was having epileptiform fits: his temperature was normal. Blood examination revealed a few *P. falciparum* ring forms. Quinine was given parenterally. The boy recovered after having been unconscious for 48 hours.

A man aged 40 had symptoms resembling those of acute lymphangitis affecting both hands and fingers. The temperature varied between 100 and 103°F. *P. falciparum* was found in the blood. The suggestion is made that the symptoms were due to the obstruction of capillaries by the parasites. The symptoms responded quickly to treatment with quinine.

A boy aged 14 suffering from fever had great difficulty in swallowing; liquid food regurgitated through the nose; his voice was nasal. *P. falciparum* was found in the blood. Quinine administration resulted in complete recovery.

A man aged 30 suddenly developed an attack of cerebral malaria. He was unconscious for seven days. The temperature never rose above 101°F. Symptoms of heart-block with slow irregular pulse were present. A blood smear showed many *P. falciparum* rings. Recovery followed quinine treatment.

A man aged 24 was admitted to a surgical ward as a case of "acute abdomen" requiring immediate operation. Before the operation could be performed he had a rigor and the temperature rose to 105°F. *P. malariae* was found in the blood. All the symptoms disappeared after treatment with quinine.

*Norman White*

PIERI, J. & PANZANI, R. Narcolepsie et paludisme. [**Narcolepsy and Malaria.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 3/4, 100–103.

A retired colonial aged 55 suffered from an irresistible urge to fall asleep whenever he sat or lay down, but never when he was on the move. There were no prodromal symptoms of these attacks of somnolence which lasted several minutes, but they were accompanied by a sudden feebleness of the lower extremities. When he awoke the patient could relate the dreams he had had. There were few other symptoms or physical signs of significance; what there were pointed to some trouble in the infundibulo-bulbar portion of the brain. While in hospital he developed a sudden febrile attack and numerous *P. vivax* parasites were found in his blood. Treatment with quinine and maxiton cured not only the malaria but also the narcolepsy. The slight glycosuria that he had had disappeared likewise; his obesity decreased. Some atheroma and arterial hypertension alone remained.

It was not possible to prove that malaria was the cause of the narcolepsy syndrome of long duration, but their association was significant.

Another remarkable feature of this unusual case is that the only known infection with malaria that the patient had acquired was in Salonika during the 1914–18 war. *Norman White*

See also p. 228, RICKETTS, **A Study of 22 Cases of Carrion's Disease with Intercurrent Malaria.**

ROSS INSTITUTE INDUSTRIAL ADVISORY COMMITTEE [WIGGLESWORTH, A., Chairman]. LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE. Information and Advisory Service. 1949, Nov., No. 2, 15 pp. **Anti-Malarial Drugs.**

The second bulletin of this series deals extensively, but with great clarity, with the use, properties and dosages of the newer principal antimalarial drugs now in use, namely, quinine, mepacrine, proguanil, chloroquine, pamaquin, pentaquine and isopentaquine.

The bulletin opens with a useful and salutary section on nomenclature, to which is added a list of the drugs with their common synonyms. Next is set out a section on the use of these drugs in the different forms and stages of malaria ; and this is followed by a very useful table in which is shown the properties of the drugs in relation to treatment and prevention of subtertian and benign tertian malaria, and their relative toxicity.

Each drug is then considered separately and in detail, and the bulletin closes with observations on combinations of the drugs, their indications and dosage. The end of this section gives a guide to the choice of drugs in prevention and treatment of the two broad clinical forms of malaria, for a non-immune and partially immune people respectively.

There is a final note on the place of drugs in the mass prevention of malaria, in which the author stresses the temporary nature of such a measure as an expedient designed to tide over the period in which more permanent control methods are being organized.

One criticism is suggested, in the interests of clarity. The dosage of chloroquine is shown without reference to whether the base or the common preparation chloroquine diphosphate is referred to : in fact the dosages given are in terms of the base, 0·155 gm. of which is contained in 0·25 gm. of the diphosphate, so that a dosage of 0·6 gm. of chloroquine (base) would amount to approximately 1 gm. of chloroquine diphosphate. For this reason, it is usual to express the dosage of chloroquine in terms of base, and unless this is made clear, practitioners and laymen might be confused.

This bulletin represents a very valuable compendium of antimalarial drugs and should prove of the greatest practical use to its readers.

*H. J. O'D. Burke-Gaffney*

VANBREUSEGHEM, R. Sensibilisation à la quinine et à d'autres médicaments. [**Sensitization to Quinine and to other Drugs.**] *Ann. Soc. Belge de Méd. Trop.* 1949, June 30, v. 29, No. 2, 247–50.

A girl of 14 years after taking one aspirin tablet developed patches of vesicular erythema in different parts of the body. She recovered after treatment with an antihistaminic preparation. Six weeks later a scratch test with aspirin was done ; a strong erythematous vesicular reaction was the result.

Eight days later the child took 0·5 gm. of quinine. Seven hours later a violent general reaction occurred, exanthem, conjunctival congestion, pain

in the eyes, some oedema, enlargement of lymph glands, raised temperature. Treatment with benadryl was successful.

This sensitivity to quinine was not a predisposition, but had been acquired. Two years before the incidents related above the child sailed for the Congo. During the voyage she was given 0·5 gm. of quinine a day as a prophylactic, with no untoward results. When she had been but 15 days in the Congo she developed some swellings in the skin which were thought to be due to mosquito bites. Some fever developed and quinine was increased to 1 gm. a day. It was some time before the symptoms that developed were found to be a reaction to quinine. The author stresses the value of cutaneous tests for sensitization to drugs, in the elucidation of some difficult cases. *Norman White*

BYLMER, H. J. T. **Clinical and Parasitic Relapses of Vivax Malaria in the Netherlands ; Influence of various Modes of Treatment.** *Documenta Neerlandica et Indonesica de Morbis Tropicis*. Amsterdam. 1949, June, v. 1, No. 2, 97–103, 1 map.

The town of Wormerveer (population 10,500) in the province of North Holland has had a special reputation, since the beginning of this century, for the treatment and follow-up of malaria patients. It was here that KORTEWEG did his well known work, and the population ever since has been more amenable to medical discipline than the general civil population elsewhere. It was possible here to treat malaria patients with quinine combined with plasmoquine (quinoplasmine) ; in neighbouring communities quinine or atebrin [mepacrine] was usually employed. As a result the relapse rate was much lower in Wormerveer than elsewhere, but in 1938 the infection rate of *A. maculipennis atroparvus* in Wormerveer was about the same as in the nearby town of Uitgeest where plasmoquine had not been used. It seemed possible that plasmoquine, while preventing clinical relapse, had little or no effect on chronic parasitaemia alone. To determine this point, a four years' study was undertaken in the Franeker mental asylum, in Zaandam and in a quarter of Amsterdam. The results showed that a 14-day treatment with three tablets of quinoplasmine (each containing 300 mgm. quinine sulphate ; 10 mgm. plasmoquine hydrochloride) daily was far more effective than a 14-day treatment with 1·0 gm. quinine sulphate a day. Of 99 patients treated with quinine alone, 48 per cent. had a clinical relapse : of 123 patients treated with quinoplasmine, 13 per cent. had a clinical relapse. Chronic parasite carriers in the two groups were 11 and 5 per cent. respectively. The anomalous infection index of anophelines n Wormerveer remains unexplained. *Norman White*

DÄHNE, G. Verhalten der Retikulozyten bei einer für Malaria spezifischen Therapie. [**The Reticulocytes in Specific Anti-Malarial Therapy.**] Reprinted from *Deut. Tropenmed. Ztschr.* 1943, v. 47, No. 6, 129–42. [Numerous refs.]

The author gives a short account of the literature dealing with reticulocyte counts in malaria. He gives details of such counts over a period of days in normal subjects and concludes that there is little day-to-day variation in the healthy person. Most authors have reported an increase in reticulocyte counts in severe malaria at some stage, especially during or after treatment with specific antimalarial drugs. Dähne suggests that two factors might be involved, *i.e.* (1) the bone marrow response to red cell destruction, and (2) specific action on the marrow by the drugs. He gives details of experiments designed to determine the influence of quinine and atebrin [mepacrine] on the reticulocyte count in healthy subjects, and in subjects : (1) with malarial histories but no current malaria, (2) suffering from the early stages of malaria but not anaemic, and (3) suffering from anaemia caused by factors other than malaria.

The number of experiments is small, but the results demonstrate an increase in reticulocytes (mostly group IV) within 3–8 days after the institution of either quinine or atebrin therapy whether or not malaria is or has been present. The degree of increase in reticulocytes and the length of its persistence is the same for the two drugs. The author believes that his figures indicate a direct action of the drugs on the marrow, giving rise to an increased discharge of reticulocytes from the marrow, and possibly increasing the turnover.

The appearance of a reticulocytosis in normal non-anaemic and non-malarious subjects after therapeutic dosage of quinine and atebrin greatly reduces the significance of the suggestion made by MACHWILADZE (quoted in this article) that the development of a reticulocytosis after specific antimalarial therapy was indicative of latent malaria infection.

[Most authors agree that in both human and simian malaria a considerable increase in reticulocytes occurs soon after the beginning of specific drug therapy. Some, *e.g.* THONNARD-NEUMANN (*Deut. Tropenmed. Ztschr.*, 1944, v. 48, 129) have indicated that the presence of malaria parasites in the peripheral blood inhibits the escape of reticulocytes from the marrow, and that the reticulocytosis which follows specific treatment is the result of the removal of this barrier consequent on the destruction of the parasites. Dähne's somewhat scrappy presentation of his evidence does not help much here. It is obvious that further work should be carried out on the action of antimalarial drugs on the bone marrow.] *B. G. Maegraith*

PIERS, F. O. **" Oedipus Complex, Skin Fungus, Anxiety State "—and Mepacrine.** *East African Med. J.* 1949, Sept., v. 26, No. 9, 260–62.

" A case of severe exfoliative dermatitis of the hands and forearms combined with symptoms of cerebral and nervous excitement is reported. The patient had a markedly ill-balanced personality. The condition was thought to be due to the prolonged use of mepacrine as a malaria prophylactic."

FISHMAN, A. P. & KINSMAN, J. M. **Hypoplastic Anemia due to Atabrine.** *Blood.* 1949, Aug., v. 4, No. 8, 970–76, 2 figs.

Seven patients suffering from a hypoplastic anaemia which developed after prolonged atebrin [mepacrine] administration, and which was attributed to the atebrin, are the subject of this report. All had been on atebrin (0·1 gramme daily) for long periods, eight to 18 months. The anaemia appeared during the period of administration or within a few days of discontinuing atebrin in two cases ; in the rest it was first noted one to three months after discontinuance of the drug. Four patients were admitted to the Moore General Hospital for dermatitis, two for anaemia and one for diarrhoea and otitis media. The anaemia was severe (below two million red cells per cmm.) in three cases, moderate (below three million) in three cases and mild (4·1 millions) in one case. It was usually hyperchromic and macrocytic, and associated with leucopenia (granulopenia) and thrombopenia. Reticulocytes were below 1·0 per cent. in six cases.

The main symptoms other than anaemia and dermatitis were weakness and haemorrhages from mucous membranes, into the skin, and into the retina.

All received transfusions and liver extract by mouth and parenterally ; in some cases iron, folic acid, ascorbic acid and penicillin were added.

Four patients recovered and three died, one from haemorrhage and two from intercurrent infections after reaching a very low state despite repeated transfusions.

The authors consider that the hypoplasia of the marrow resulted from " the initial cumulative depression due to ingestion of the drug and the perpetuation of the depression by residual stores of the drug within the body ".

*L. E. Napier*

PEETERS, E. M. E. Essai thérapeutique de la malaria par un antipaludique de synthèse injectable (lactate de paludrine). [**Experimental Treatment of Malaria by Intramuscular Injections of Paludrine Lactate.**] *Ann. Soc. Belge de Méd. Trop.* 1949, June 30, v. 29, No. 2, 225–9.

In Léopoldville, Belgian Congo, eight children, aged one to five years, suffering from acute malaria, with heavy parasitaemia in all cases, were treated with paludrine lactate injected intramuscularly at a dosage of 0·01 gm./kgm. The results were good but, as all the children received paludrine by mouth after the injections it is not possible to draw any firm conclusions as to the advantages of the intramuscular injections. The procedure appeared to be harmless, though sometimes a little painful. *Norman White*

SCHNEIDER, J. & MÉCHALI, D. Traitement curatif du paludisme à *Pl. malariae* par le chloriguane (chlorhydrate N-1-P-chlorophényl-N-5-isopropyl diguanide). [**Curative Treatment of *P. malariae* Malaria with Chloriguane.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 5/6, 156–8.

Chloriguane, whose chemical constitution is indicated in the title of this paper and is the French equivalent of proguanil, is said to have given good results in the treatment of *P. falciparum* malaria, but its action on *P. vivax* infections was less effective than that of nivaquine. The authors report the treatment of 14 patients suffering from *P. malariae* infections with the drug. The daily dosage was either 0·3, 0·6, or 1·0 gm. of the base. The results obtained with the different doses were almost identical. The action of the drug is much slower than that of other antimalarial remedies. Asexual parasites disappeared from the blood only after an interval of seven to eight days (average) : in some cases it was considerably longer. *Norman White*

THIODET & FABREGOULE. Hématurie au cours d'accès palustres traités par le chloriguane. [**Haematuria during a Malarial Attack treated with Chloriguane (Proguanil).**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1949, No. 25, 1082–3.

The authors refer briefly to the properties of proguanil and the absence of toxicity generally claimed for it in the literature. They then quote a case of *P. vivax* infection treated in relapse with the French equivalent, known as chloriguane or diguanyl.

The patient, a female child of seven weighing 23 kgm., had suffered a primary attack of *P. vivax* some three months earlier : this first relapse was treated with three tablets each of 0·1 gm. of chloriguane on the first day, and five tablets on the second. On the third day the temperature had fallen, but the child had violent lumbar and abdominal pains : tenderness was found only in the kidney region and the spleen was not enlarged.

The urine was bloodstained and was found to contain albumin and many red blood corpuscles, but no casts. These continued to appear, in diminishing quantity, until the fourth day.

The authors stress that the condition was a haematuria and not a haemoglobinuria and that such an occurrence is rare in the course of malaria and exceptional in *P. vivax* infections.

The child did not have such attacks at any time other than on the occasion when chloriguane was given. The primary attack had been treated with nivaquine.

The authors find no reference in the literature to an analogous case, but consider that the rôle played by treatment in the determination of this haematuria seems to be "*indiscutable*".

They add that a dose of 0·5 gm. of chloriguane in one day after 0·3 gm. the preceding day is, in their view, undoubtedly excessive for a child weighing 23 kgm.: they believe this to explain the transitory haematuria, which perhaps would not have occurred with normal doses below 0·2 gm. Nevertheless, this dose is well within the margin of safety.

It is suggested that in giving these preparations prudence is required: and that it would be interesting to make systematic examination of the urine of patients having chloriguane treatment, as microscopic evidence of haematuria might be found. *H. J. O'D. Burke-Gaffney*

Canet, J. Nivaquine et paludrine : posologie curative optima. [**Most Effective Curative Dosage of Nivaquine and Paludrine.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 5/6, 278–85. [10 refs.]

As a result of an extensive trial of the treatment of acute attacks of malaria with either nivaquine or paludrine [proguanil] the author has reached the following conclusions. Nivaquine is a definitely more potent remedy than paludrine: both are very effective. Doses of either drug less than 0·3 gm. a day are insufficient for the prompt suppression of a malaria attack: 0·3 gm. a day is sufficient to suppress an attack both clinically and parasitologically in four to six days: this is the optimum dose in most cases. Higher doses give quicker results. In grave cases, 0·6 gm. paludrine a day for five to seven days has been given without any ill effect. Nivaquine has been given in doses of 0·6 gm. the first day, 0·5 gm. the second day and 0·3 gm. a day for the following three days. There is no advantage in further increasing these massive doses. Both drugs are well tolerated. In some 4 to 5 per cent. of patients nivaquine may induce a certain degree of insomnia, even in doses of 0·3 gm. a day: a mild hypnotic is sufficient to counteract this.

These investigations were carried out on rubber estates in North Cochin-China. Ninety per cent. of the patients had *P. falciparum* infections, 10 per cent. *P. vivax*. [See also Canet below.] *Norman White*

Robin, C. & Issa, D. Essais thérapeutiques du paludisme par la Nivaquine B en milieu africain à Dakar. [**Therapeutic Trials of Nivaquine B in the Treatment of Malaria among Africans in Dakar.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1948, v. 5, No. 1, 139–47.

Twelve patients suffering from malaria were treated with Nivaquine B (Resoquine) [these are synonymous with chloroquine]. Eleven were infected with *P. falciparum*, one with *P. malariae*. Notes are recorded of each case. The schizonticidal activity of the drug equalled that of quinacrine [mepacrine]. Nivaquine B is in certain respects preferable to quinacrine; it never produced nausea, vomiting or diarrhoea; there were no signs of drug intolerance in any case. It was given in the form of tablets, each containing 0·1 gm. of the drug: these were readily absorbed. *Norman White*

Birtwell, S., Curd, F. H. S. & Rose, F. L. **Synthetic Antimalarials. Part XLIV. The Preparation of Diguanides by the Reaction of Substituted Amino- (including Guanidino-) magnesium Halides with the >N·C≡N Group.** *J. Chem. Soc.* 1949, Oct., 2556–61.

BIRTWELL, S. **Synthetic Antimalarials. Part XLV. Reactions between Mono-Substituted Cyanoguanidines and Grignard Reagents leading to *N*-*p*-Chlorophenylguanylamidines.** *J. Chem. Soc.* 1949, Oct., 2561–72.

CANET, J. Premiers essais de prophylaxie collective du paludisme en Indochine méridionale par la nivaquine B (résoquine) et la paludrine. [**First Trials in Southern Indo-China of Mass Prophylaxis of Malaria with Nivaquine B (Resoquine) and with Paludrine.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 5/6, 165–8.

Since November 1947, experiments on a large scale have been carried out with nivaquine and paludrine [proguanil], respectively, in the mass prophylaxis of malaria among agricultural workers on the rubber plantations on the laterite soil of North Cochin-China where malaria is hyperendemic. These workers originated from Tonking but they have long been settled on the rubber estates. Various dosages have been tried: weekly doses of 0·2 or 0·3 gm. for both paludrine and nivaquine; curative courses of treatment, consisting of 0·3 or 0·5 gm. a day for two or three days, followed by the weekly suppressive treatment.

Both drugs proved their value. Paludrine was just as effective as quinacrine [mepacrine]; nivaquine more effective. The superiority of nivaquine over paludrine, with the same dosage, was shown by splenic, splenometric and parasite indices, as well as by freedom from clinical attacks. Neither drug has any direct action on gametes.

The weekly dose of 0·2 gm. of paludrine recommended by English authors is undoubtedly too small for mass prophylaxis in the hyperendemic areas of Indo-China. The optimum dose for suppression is 0·3 gm. a week, for both drugs.

There was never any sign of intolerance to either drug: in this respect both drugs are definitely superior to quinacrine. Three or four weeks after the cessation of mass prophylaxis with either drug the malaria incidence rapidly rises to levels equal to those pertaining before the suppressive administration was started. *Norman White*

DE ROOK, H. **Prevention of Malaria with Proguanil in New Guinea.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1949, June, v. 1, No. 2, 160–64, 1 map.

This test of the prophylactic value of proguanil was carried out on prisoners in Renu Jail, which is four miles from Sorong on the west point of New Guinea. The 500 prisoners were a fairly homogeneous group, adult male Indonesians, more than 90 per cent. of them from the Southern Celebes. They had been in the New Guinea lowlands for 13 to 21 months when the experiment started. Malaria is endemic; in Malanu, the nearest Papuan village, of the 92 inhabitants, 94 per cent. had splenic enlargement, 40 per cent. had parasitaemia.

During a period of three months a group of 211 prisoners each received 100 mgm. proguanil twice a week; 260 others served as untreated controls. Endemic malaria decreased somewhat during the course of the experiment, independently of medication. During the three months, 9 per cent. of the control group had *P. vivax* malaria, and 3 per cent. of the proguanil group. The incidence of *P. falciparum* malaria was 5 and 0·5 per cent. respectively. At the end of the experiment, the spleen rate of the control group was 38 per cent.; of the proguanil group 8 per cent. The parasite rates were, control group 13 per cent.; proguanil group 4 per cent. (no *P. falciparum*). Three and a half months later the spleen rate of the control group was 26 per cent.; of the proguanil group, 11 per cent. The parasite rates were, 15 per cent. control group; 7 per cent. proguanil group. *Norman White*

Coda, D. Expériences sur la chimioprophylaxie du paludisme au Brésil. [**Chemoprophylaxis of Malaria in Brazil.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 5/6, 168–72. [14 refs.]

During the war, Brazilian troops were stationed in towns and villages along the coast of the State of São Paulo where malaria is always endemic. For their protection from malaria reliance was placed on suppressive medication : mepacrine or metoquine was used. When beginning treatment each man was given three tablets of one or other of the drugs each day for five days. A week later a weekly administration of three tablets was begun. During a period of three years, 4,112 officers and men were so treated : only 37 contracted malaria, 0·9 per cent. In neighbouring cantonments where drug prophylaxis was not in force the malaria incidence was high. During the three years in the communes in which the protected soldiers were stationed 11,142 cases of malaria were reported among the civil population. A large number of *A. tarsimaculatus* and *A. albitarsis* were caught in buildings occupied by the protected troops. *Norman White*

Rosebery, Hélène. Un ennemi : le paludisme. Une arme : la coopération sanitaire internationale. [**One Enemy, Malaria : One Weapon, International Sanitary Cooperation.**] *Arch. Méd. Sociale.* Paris. 1949, July–Aug., v. 5, No. 4, 199–204.

A general discussion.

Swellengrebel, N. H. **Malaria Control in the Netherlands.** Reprinted from *Chem. Products.* 1946, Sept.–Oct., 5 pp.

This is an interesting and well-presented account. It is of a " semi-popular " nature and does not lend itself to abstracting in this *Bulletin*.

Aziz, M. **Report on the Anopheles (Malaria) Eradication Programme for the Year 1948.** *Cyprus Ann. Med. & San. Rep. 1948.* Appendix I, 24–35, 6 charts & 4 figs.

The *Anopheles* Eradication Programme in Cyprus, as previously stated, has been conducted in three yearly stages. Reports on the work during 1946 and 1947 have been abstracted in this *Bulletin*, 1948, v. 45, 152 ; 1949, v. 46, 16.

The work for 1948 covered the whole island (3,584 square miles) with special attention to approximately 1,000 square miles which had not been covered by the earlier work. During the winter months, a search of houses and other shelters likely to harbour hibernating adults was made and these places were sprayed with [dilute] DDT in kerosene.

During the summer months, the usual attack on larval breeding places was continued. The maximum number of men employed by the scheme was 769 in May ; this included 396 casual labourers and 260 regular labourers.

An average of 143 larva checkers was employed throughout the year ; these men examined roughly 500,000 breeding places per month. The number of breeding sites found positive varied from 0·33 per cent. in January to 0·0003 per cent. in November. From June onwards, the numbers positive were below 0·01 per cent.

An average of 176 men were employed as adult checkers ; they searched an average of 163,000 shelters per month. The percentage positive declined from 0·25 in January to 0·001 in June and rose slightly to 0·007 in November and 0·0036 in December.

The distribution of the zones found negative for all species of mosquito, throughout the year, is given in some detail ; these data fall into the following areas of the eradication scheme :—

| | 1946–7 Eradication Area (41 zones) | | 1948 Eradication Area (70 zones) | |
|---|---|---|---|---|
| | Zones | Per cent. | Zones | Per cent. |
| Negative for adults ... ... | 37 | 90·2 | 16 | 22·8 |
| ,, ,, larvae ... ... | 29 | 70·7 | 5 | 7·1 |
| ,, ,, both ... ... ... | 28 | 68·2 | 5 | 7·1 |

Of the mosquito larvae found, the greatest number belonged to *A. bifurcatus* followed by *A. marteri* and *A. superpictus* ; very small numbers of *A. sacharovi*, *A. algeriensis* and *A. multicolor* were found.

Malaria is still not a notifiable disease and nearly all the reliable data about it come from Government doctors and institutions. The number of cases reported in 1948 was 406, of which three were suspected of being new infections. The numbers of cases reported in previous years were : 1947, 1,989 ; 1946, 4,489 ; 1945, 5,908 ; 1944, 7,686.

In 1948, 961 slides were examined for the presence of malaria parasites ; 17 (1·7 per cent.) were found positive. The parasite rate of over 5,000 school children was 1·3, compared with 4·5 in 1947 ; corresponding spleen rates were 10·6 and 18·3.

The cost of the operations in 1948 was approximately £120,000, made up roughly, as follows : (£ thousands) labour 69, supervisory and clerical 19, travelling and transport eight, materials 23. *J. R. Busvine*

WALTON, G. A. **On the Control of Malaria in Freetown, Sierra Leone. II. Control Methods and the Effects upon the Transmission of *Plasmodium falciparum* resulting from the Reduced Abundance of *Anopheles gambiae*.** *Ann. Trop. Med. & Parasit.* 1949, Oct., v. 43, No. 2, 117–39, 20 figs. [21 refs.]

The strategic importance of the Freetown Estuary in the Second World War, and an annual hospital-admission malaria rate in 1940 of 6,000 per 1,000 strength of European troops led the British Government to send an eminent expert to investigate the problem of malaria in shipping, to second experienced senior members of the West African Medical Service, to appoint a research entomologist to study the bionomics of *A. gambiae* and to allocate the necessary funds for investigation and control. The combined efforts of civilian and military malariologists, together with the introduction of mepacrine in 1943 as a routine suppressive for all European servicemen and seamen, produced a drastic reduction in time lost due to malaria. The Sierra Leone and British governments pursued the problem of the eradication of *A. gambiae* from the urban area of Freetown and to this end from January 1st, 1944, nine Europeans and 364 Africans were employed by the local government medical department at an average annual cost of £20,400. The author of this paper, a medical entomologist, formulated the plan of campaign and was actively engaged from 1943 to 1946. Control measures by larvicides, primarily intended to protect European servicemen, were producing changes in the incidence of malaria in the resident African population. The reduction in the numbers and infection rate of *A. gambiae* so achieved was described in a previous paper by the author [this *Bulletin*, 1948, v. 45, 401]. The mean number of

*A. gambiae* per 1,000 rooms fell from 440 in 1942 to 85 in 1946, the sporozoite rate from ?10 per cent. [*sic*] to 0·3 per cent., and infected *Anopheles* per 1,000 rooms from ?44 [*sic*] to 0·2 per cent.

*Plasmodium falciparum* is virtually the only parasite seen. Wet season infection rates in infants (one to 16 months of age) fell from 4·7 per cent. in 1945 to 1·7 per cent. in 1946, compared to 70·6 per cent. in a random sample (ten to 12 months of age) in 1931 ; however, the degree of severity became higher as the infection rate decreased, owing, presumably, to loss of immunity following infrequent infective bites. Wet season infection rates in the children aged 5–7 years fell from 32 per cent. in 1944 to 10·7 per cent. in 1947 ; the latter figure was considered to be a basic minimum because of travel to and from the uncontrolled countryside ; a 10 per cent. parasite rate would result from 0·5 infective bites per year per child. Severity of infestation in the infected individual increased as the infection rate and immunity decreased. Histograms illustrate the changes in the spleen rates and sizes in the urban, suburban and rural sections of Freetown. Marked reduction in the size of spleen occurred in all areas, size bearing a relation to degree of immunity ; there was no great change in rates between 1944 and 1946. The proportion of large spleens in 1946 was highest in the urban and lowest in the rural sections of the town.

Pregnant women exhibit the same rate of parasite infestation and similar seasonal changes as children aged 5–7 years. Parasite rates in adults were found to be much lower than in pregnant women and school children. The author suggests that, since few of the pregnant women showed clinical symptoms of malaria, immunity must be of two distinct types, one of which neutralizes the toxic effects of the parasites and the other reduces the numbers of parasites circulating in the blood stream ; during pregnancy the ability to limit the numbers of parasites appears to be lost and the women revert to a "child-type" of reaction to infection.

From 1940 the total live births notified in Freetown were 1,400, and the infant mortality rate was 180 ; in 1945 they were 2,300 and 150 respectively. This indicates more births and more survivals in a population of 80,000.

A striking effect of control was the dramatic fall in salivary-gland infections in *A. gambiae* from the usual 10 per cent. to 0·4 per cent. occurring in 1945 and maintained subsequently. What is the cause ? The author discusses this at some length as he had observed that despite the fall in parasite rate of the people there was no coincident fall in crescent rate ; ROBERTSON [this *Bulletin*, 1945, v. 42, 860] had contradicted the deep-rooted conviction that a large concentration of gametocytes in the peripheral blood was necessary to infect an anopheline, having succeeded in obtaining experimental infection in one of 13 *A. gambiae* fed on an adult African with a blood concentration of gametocytes equivalent to 14 crescents per mosquito meal. The author concludes that there is little change in the gametocyte reservoir available to the much reduced anopheline population, that infection of mosquitoes continues, but that few survived for the period of completion of the sexual cycle of the parasite because of the use of pyrethrum insecticide as soon as any recurrence of anopheline breeding was detected.

Summarizing the situation in 1946, the author believes that an irreducible percentage of malaria incidence in Africans has been reached, namely : "Infants one year old, 6 ; sick infants, 12 ; schoolchildren, 10 ; pregnant women, 10 ; sick adults, 12 ; otherwise healthy adults, 2·5 ; spleen-rate in children, 14. Europeans in the three Services were acquiring malaria infections at a rate of about one in 30 per year. The risk of being admitted to hospital with malaria had been reduced by 96 per cent. in 1945 as compared with 1941. Only one *A. gambiae* could be found on an average in every 6·6 per cent. of rooms, and only 0·4 per cent. of these had a salivary-gland infection.

" In the urban area the chance of acquiring malaria was very small. Only 3·3 per cent. of the schoolchildren had parasites in their blood, and in some schools 5 per cent. of the children had enlarged spleens which could only be described as ' just palpable '.

" A very great burden of malaria had been lifted from the population. The results were brought about almost entirely by spraying with larvicide and pyrethrum. The cost (including funds expended by the three Services) was more than £150,000, spread over five years, in an area of 35 square miles."

Malaria in Europeans in Freetown is now a comparative rarity, but one-tenth of the shifting African population retain malaria parasites. Severe infection in the African is on the increase. Relaxation of control could lead to an epidemic, possibly with a temporarily high mortality. The maintenance of the existing situation will depend entirely upon adequate skilled European supervision. " Direct " spraying of insecticides and " indirect " engineering work must continue.

[The situation in Freetown to-day appears to have resulted from (*a*) street and stream drainage which limited *gambiae* breeding places ; (*b*) the use of larvicides ; (*c*) the use of pyrethrum sprays to kill adults in dwellings where necessary ; (*d*) a highly efficient organization. The precise cause of a cessation of transmission of malaria appears to be the short life of the comparatively few adult mosquitoes produced ; it is expected that the gametocyte reservoir in the population will steadily fall but the introduction of carriers, both human and mosquito, from the " uncontrolled " countryside must continue.

Does this Freetown experience, so ably expounded by the author, not indicate that the future measures of control of *A. gambiae* in Africa at large must be directed at shortening the life of the female mosquito to the extent that egg-laying will be minimal and the completion of the sexual cycle of the malaria parasite impossible ? The answer may well lie in the scientific use of residual insecticides.] *R. Ford Tredre*

JOHNSTON, A. N. **Studies on the Action of DDT on Anopheline Mosquitos and House-Flies.** *Bull. Entom. Res.* 1949, Dec., v. 40, Pt. 3, 447–52.

A.—*Experiments with larvae.*

Larvae of *Anopheles punctulatus punctulatus* were exposed to films of 4 per cent. pp′DDT in malariol at the rate of 4·3 mgm. DDT/sq. ft. Exposures varying from one second to 15 minutes were made and the larvae then changed to clean water. Mortalities of 35 to 100 per cent. were obtained in proportion to the exposure given.

B.—*Tests with pupae.*

Pupae of *A. p. punctulatus* were exposed to films of 5 per cent. DDT at the rates of one and two pints per acre with exposures of 25 minutes or continuously (there was little difference). The results showed that a considerable proportion died before emergence and the adults of the others died during emergence. It is therefore evident that DDT solution has some toxic action on pupae.

C. and D.—*Experiments with adult mosquitoes and houseflies.*

Strips of plywood treated with DDT at the rate of 100 mgm./sq. ft. were placed in one-inch test tubes and the insects confined with them for varying periods. After exposure, the insects were transferred to clean cages. It was found that the houseflies required a much shorter time (30 seconds) than the mosquitoes (15 minutes) to pick up a lethal dose. Some evidence was obtained to show that flies can contaminate a clean surface with DDT after resting on a treated one. *J. R. Busvine*

Swellengrebel, N. H. & Stack, T. L'action du DDT sur les anophélines du groupe *punctulatus* par vaporisation dans les maisons. [**DDT Spraying of Houses against** *Anopheles* **of the** *punctulatus* **Group.**] *Ann. Soc. Belge de Méd. Trop.* 1949, June 30, v. 29, No. 2, 207–12.

The experiments described were carried out in the north-east of New Guinea. *A. punctulatus* attacks man in the open air and even during the day. The experiments show that DDT spraying of houses is likely to avail little in the control of malaria spread by *A. punctulatus*. *Norman White*

Smith, H. F. & Dy, F. J. **The Use of DDT-Treated Sawdust for the Control of Anopheline Mosquito Larvae in Streams.** Reprinted from *Acta Med. Philippina.* 1947, Oct.–Dec., v. 4, No. 2, 8 pp., 6 figs.

In the Philippine Islands, where the principal vector of malaria is a stream breeder (*A. minimus flavirostris*), the older methods of larval control by vegetation clearance, application of larvicides, etc., are difficult to apply because of the difficulty of access to stream banks.

Contact of DDT with larvae was successfully attained by the use of sawdust, which had been impregnated with 2 per cent. DDT solution in industrial diesel oil. The quantity of oil in the sawdust is such that it is not wet enough to drip when a small quantity is squeezed in the hand.

The method of application was by sprinkling along the edges of the stream or dumping a dipperful of impregnated sawdust at intervals of 20 to 50 yards. A single application was effective in controlling larvae for seven to 14 days. This time factor bore a relation to the width of the stream, where the dumping method was used.

Sawdust particles, after travelling variable distances on the surface of the water, become lodged in vegetation, débris, etc., and form minute reservoirs of DDT. The results attained are tabulated.

[This method should be considered in conjunction with the application of an oil with high-spreading power containing DDT as described by Ribbands [this *Bulletin*, 1946, v. 43, 1014] and Macdonald [*ibid.*, 885].

*R. Ford Tredre*

Swellengrebel, N. H., & Lodens, J. G. *Anopheles aconitus* **and DDT Spraying.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1949, Sept., v. 1, No. 3, 245–54, 1 chart.

*A. aconitus* is an important malaria vector in rice-growing areas in the hills of Java. This paper describes the effects of DDT spraying on house populations of this and other mosquitoes up to a year after treatment. The houses were of normal Javanese type, with walls of rough-surfaced bamboo matting. Of seven houses in one site, four were treated, and three out of six at another site. Treatment was with kerosene solution of DDT, mainly 5 per cent. at 40–80 ml. per sq. m. Observations were made with great care, once or twice a month (five mosquito catchers would each search the house for twenty minutes).

The mosquitoes caught per visit averaged eight and thirteen in untreated and four and three in treated houses (respectively, for the two sites). Of the mosquitoes caught in treated houses, all but 5·7 per cent. at one site and 2·6 per cent. at the other, were dead or dying. Only one dead mosquito was found in the untreated houses.

It was not easy to determine when the effectiveness of the DDT declined because the numbers in both treated and untreated houses declined eventually for climatic reasons. But it was noteworthy that the proportion of *A. aconitus*

found dead with blood meals increased towards the end of the period. This suggests that the DDT was not strong enough to kill them *before* feeding, as it had been in the earlier months.

The author believes that the smaller average numbers of mosquitoes found in treated houses is not due to the "repellent" effect of DDT discovered by Muirhead Thomson for *A. gambiae* [this *Bulletin*, 1947, v. 44, 795] because the highest total catch was actually found in a treated house. The generally lower numbers are presumed to be due to dying mosquitoes slipping between the split bamboo floor boards in their death struggles. In view of the considerable numbers of dead and dying mosquitoes found, in the houses, throughout the period of observation, it is clear that there cannot be a repellent effect strong enough to protect them from the lethal effects of DDT. *J. R. Busvine*

Pinotti, M. **"DDT Spraying in Brazil".** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Nov., v. 43, No. 3, 347.

Dr. Pinotti is Director of the National Malaria Service in Brazil and he writes to clarify a reference in Professor Malamos's paper on "Tropical Diseases in Brazil" which is not exact [this *Bulletin*, 1949, v. 46, 1190].

In that paper, Professor Malamos stated that :—

"Every year DDT is employed in the country on a larger scale. DDT spraying has been carried out only from airplanes (helicopters) but, as I was told, the large extent of waterways and distribution of the breeding places prevent favourable results. In some southern districts only, this method gave good results. In the Amazon valley, spraying from the air would be a waste of work and money. The method of choice is the spraying of all the houses in an endemic area."

Dr. Pinotti points out that spraying of DDT from helicopters by his Service was done only experimentally in limited areas of the State of Santa Catarina, against *Kerteszia*, vectors of malaria in the south of Brazil. In the other States of Brazil, DDT is used inside houses and up to July, 1949, some 2¼ million houses had been so treated : even in *Kerteszia* areas, house spraying is now employed, with satisfactory results, as the experimental spraying from helicopters in Santa Catarina was not successful and was very expensive.

The first results of DDT spraying by helicopter have already been published [this *Bulletin*, 1949, v. 46, 1120] and further results proved that method to be impracticable.

Spraying by helicopter all over Brazil was never contemplated by those responsible for malaria control in that country : no doubt language difficulties have caused the misunderstanding referred to above.

*H. J. O'D. Burke-Gaffney*

Ferreira, M. O. & Rachou, R. G. Considerações sôbre métodos profiláticos relativos aos anofelinos do sub-gênero *Kerteszia*. [**Comparative Merits of Prophylactic Measures against Anophelines of the Sub-Genus** *Kerteszia*.] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1949, Apr., v. 1, No. 2, 103–12.

In this paper the authors discuss the merits and demerits of six methods of anopheline control as applied to *Anopheles* (*Kerteszia*) *cruzii* and *A. bellator* which breed in bromeliads and are important vectors of malaria in certain parts of the state of Santa Catarina, Brazil. [See this *Bulletin*, 1948, v. 45, 1053.]

Deforestation, though sure in its results, is a method which requires great care and should be used only in restricted areas. Specialist knowledge is needed of the effects on the soil, on other plants and on water sources ; the problem of

replanting with appropriate vegetation must also be considered. The extent of an area to be thus treated depends on the flight range of the mosquitoes in that locality and on the possible effect of topographical features on the flight range.

Eradication of bromeliads by hand is possible only for terrestrial forms and care must be taken that they do not become re-established. This method is not applicable to epiphytic forms in this part of Brazil as the trees are too high and the danger too great.

Killing the tree bromeliads with copper sulphate is possible, but spraying them from the ground is not practicable because special equipment would be needed owing to the height of the trees (20 to 35 metres) and because of the impossibility of penetrating the forest with the spraying machines. The application of herbicides might be done by aeroplane or helicopter.

Insecticides such as DDT and BHC can be applied from the air and might be useful in case of emergency to reduce an epidemic of malaria. These insecticides may also be employed from ground level as aerosols.

Screening is not of much value against these mosquitoes because they are not house frequenters to any great extent.

The use of residual DDT in houses is justified because of its destructive effect on *Anopheles darlingi* (the most domestic anopheline in this locality) and the consequent reduction in malaria among the people, leading to a reduction in the number of vectors among the anopheline population ; but it is not a method of attack and the density of the bromeliad breeding species will not be affected by the indoor application of the DDT, though their capacity to transmit malaria will be reduced by the elimination of the domestic source of the infection.

*H. S. Leeson*

RAGAB, H. A. A. **Studies on the relationship between some Mosquitoes and the Malaria Parasite.** [Thesis for Ph.D. (Zoology), University of London]. 123+ix typed pp., 9 pls. & 1 chart. [Bibliography.] 1948.

This work is divided into four parts. In the first, the author describes experiments in which he shows that *Plasmodium gallinaceum* did not develop to the oöcyst stage in *Anopheles maculipennis atroparvus*. Females of this mosquito and of *Aëdes aegypti* were fed on infective chicks and then were dissected daily from the fifth to the tenth day. All *Anopheles* (72) were negative for oöcysts and all *Aëdes* (32) were positive. In later work, *A. m. atroparvus* was used as a non-transmitting mosquito. [In the lists of mosquitoes taken from the literature, one noticed that *Culex quinquefasciatus* is recorded as being capable of transmitting *Plasmodium gallinaceum* while *Culex fatigans* is listed among those found to be incapable of transmission.]

In the second study, periodical examination of smears of the midguts of both mosquitoes showed that while *Anopheles* took less than two days to digest the meal, traces of blood were still seen in *Aëdes* stomachs for four or five days. Oökinetes appeared in two hours, but in each successive smear they became fewer until at twelve hours the number in *Aëdes* had fallen to about one-tenth of the original and in two to three days oöcysts appeared. In *Anopheles* no forms of the parasite were discoverable after thirty hours. In stained sections of the midguts twenty-four, thirty and forty-eight hours after feeding, parasites were seen only in the forty-eight hour specimens of *Aëdes*. Photographs and drawings of these show that the parasites penetrate the stomach wall of the mosquito through the epithelial cells and not by passing between them. To account for the small number which reach the oöcyst stage the author puts forward two suggestions which need examination ; that some parasites grow too large to be able to penetrate the stomach wall and so die, and that the cells themselves play some part, perhaps phagocytic in nature.

Next, investigations were made into the influence of food, temperature and humidity on the infectibility and longevity of the mosquitoes. Newly emerged *Anopheles* were provided with a drinking fluid which consisted of the solution known to be a suitable medium for the cultivation of *Plasmodium knowlesi in vitro*. When the mosquitoes were seven days old they had one infective feed and a week later 126 were dissected but none showed oöcysts. This experiment was repeated with *Aëdes* and also with *Anopheles* reared from the eggs which had been laid in the solution by the first batch of females. Of 52 *Aëdes*, 48 showed oöcysts but none of the *Anopheles* became infected, and no oöcysts or sporozoites were seen in *Anopheles* mosquitoes which had had two and three feeds on an infective chick. Another experiment showed that the death rate among infected *Aëdes* was no higher than among uninfected ones fed at the same time. Batches of infected *Aëdes* were kept for six days at 18°C. and at 25°C. at relative humidities of 50, 60 and 70 per cent. Upon dissection it was observed that there was very little variation in the size of the oöcysts due to humidity but there was an increase in their numbers in those mosquitoes which had been kept at the higher humidities. Oöcysts were larger in mosquitoes which had been kept at 25°C. (18·5 to 20·2 $\mu$) than in those at 18°C. (15·8 to 17·6 $\mu$).

Finally, the last part contains descriptions and lists of the methods and media which the author employed in attempts to isolate the living midguts of the mosquitoes with the object of observing the development of the oöcysts. The media were modifications of Tyrode's, Trager's and Ball's, usually with increased glucose content. At first, contamination was troublesome and penicillin was tried but it appeared to shorten the life of the preparations for they never lived beyond the 36th hour. Later, a special slide with a perfusion chamber was developed; this was made of perspex and had grooves to accommodate a pair of hypodermic needles with their heads projecting so that rubber tubing could be attached. The construction of the slide is described and illustrated with photographs and drawings. Best results were achieved when, instead of dissecting out the gut, an observation window was opened in the abdomen to expose the gut to view without injuring the alimentary tract and then transferring the whole preparation to the perspex perfusion chamber. Some of these preparations lived for as long as four days but the shape and size of the oöcysts did not change [see also this *Bulletin*, 1950, v. 47, 109.] *H. S. Leeson*

GREENBERG, J. **The Potentiation of the Antimalarial Activity of Chlorguanide by P-aminobenzoic Acid Competitors.** *J. Pharm. & Exper. Therap.* 1949, Oct., v. 97, No. 2, 238–42. [19 refs.]

It was previously shown by the author and his colleagues [this *Bulletin*, 1949, v. 46, 119] that sulphadizine and chlorguanide [paludrine, proguanil] were synergistic in *P. gallinaceum* infections of chickens. He also reported [*ibid.*, 912] that a chlorguanide-resistant strain was hypersensitive to sulphadiazine, whereas BISHOP & MCCONNACHIE [*ibid.*, 119] found that cross-resistance to both drugs was present. The action of sulphadiazine against this plasmodium is inhibited by *p*-aminobenzoic acid (PABA), whereas that of paludrine is not. In order to investigate the synergism noted between these two drugs in relationship to PABA, the activity of chlorguanide with various substances inhibited or non-inhibited by PABA in *P. gallinaceum* infections of chickens was investigated. Birds of 42 to 55 gm. weight were used and were treated orally with drugs four to five hours before intravenous inoculation with $16 \times 10^6$ parasitized erythrocytes. Treatment was continued twice daily for four days. The degree of infection present was determined on the morning after the last dose of drug,

the minimum effective dose of which was that which caused a 75 per cent. reduction in parasitaemia with reference to controls.

No synergism was found between chlorguanide and either quinine, chloroquine, pamaquin (plasmoquine), mepacrine or the naphthoquinone (SN 8557). The synergism between sulphadiazine or sulphanilamide and chlorguanide was similar and indicates that structural differences in various sulphonamides was not a factor of importance. Synergism was not exhibited by sulphonamides which are not PABA antagonists. There was a synergism between chlorguanide and PABA antagonists which themselves act in *P. gallinaceum* infections. Although not itself inhibited by PABA in its antimalarial action, chlorguanide causes a 100-fold rise in the amount of PABA required to inhibit sulphadiazine. The author suggests that the utilization of some metabolic product from PABA is interfered with by chlorguanide. *J. D. Fulton*

McGhee, R. B. **The Occurrence of Bat Malaria in the New Hebrides and Philippine Islands.** [Research Notes.] *J. Parasitology.* 1949, Oct., v. 35, No. 5, 545.

Four out of five species of bats were found to be infected with plasmodia during a survey at Espiritu Santo, New Hebrides, and on Luzon. Parasites corresponding with *Plasmodium pteropi* were found in all of 92 fruit bats in the New Hebrides belonging to the species *Pteropus geddiei* and *Pteropus eotinus*. These represent new host records for this parasite. No malaria organisms were found in 100 specimens of Nycteribiidae which infested all the bats. The parasites in the blood stream were similar to those found by Manwell in New Guinea [this *Bulletin*, 1947, v. 44, 43] except that no segmenting forms nor exo-erythrocytic forms were found: nor were they found in stained sections of spleen, liver, bone marrow, brain and lung. The author notes that all the bats examined in a year were infected, despite effective local mosquito control.

Six of 50 specimens of *Miniopterus australis* were infected with a parasite identical with *Plasmodium murinum*, described by Dionisi in 1899: this is a new host record. Only sexual forms were found.

A single unidentified specimen of Pteropidae was examined at San Fernando, Philippines. It was infected with *Plasmodium pteropi*.

One hundred bats of the species *Hipposideros cervinus* were negative.

*H. J. O'D. Burke-Gaffney*

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## TRYPANOSOMIASIS

Gillman, C. **A Vegetation-Types Map of Tanganyika Territory.** Reprinted from *Geographical Rev.* 1949, v. 39, No. 1, 7–37, 32 figs. & 1 coloured map.

The author was requested in 1943 to prepare a vegetational map of Tanganyika Territory compiled in accordance with the classification of East African vegetation types drawn up by the Interterritorial Pasture Research Conference at Nairobi in 1940. The map is in thirteen colours, on a scale of 1 : 2,000,000 (50 kilometres to one inch), and folds into the back of a paper of 37 pages of text matter, including 31 photographic illustrations of vegetational types.

The following main types of vegetation are depicted: Forest, Woodland, Bushland and Thicket, Wooded Grassland, Grassland, Permanent Swamp Vegetation, Desert and Semi-desert and Actively Induced Vegetation. Some intermediate types, or sub-types, are also shown, *viz.*: Forest/Woodland,

Woodland/Bushland, Specialized Thickets of regional extent (the Itigi Thicket southwest of Singida and astride the east-west railway, the Msua Thicket east of the scarp behind Dar-es-Salaam, and the Euphorbia thicket of the hill chain south-east of Kilimanjaro). Grassland is divided into Valley Grassland and Ridge and Slope Grassland. Actively Induced Vegetation is shown as either of native origin or due to alien cultivation and usage. A coloured inset map demonstrates the distribution of the baobab tree.

The text matter gives a description of each of these vegetational types and expands the concept of actively induced vegetation to demonstrate its interpretation to settlements in the inland plateaux, in highland areas and along the coastal strip.

The difficulty of representing on the map complex areas characterized by two or more main vegetational types is met in two ways : by one method the ground colour represents the dominant vegetation and minor types are shown by coloured dots dispersed over the ground colour in a density indicating their frequency and extent. This device is used to bring out the interrelationship of forest with the invasive spread of ridge and slope grassland and its association in turn with induced vegetation, either native or alien. This is particularly characteristic of the mountain masses north of Lake Nyasa and the chain of highlands extending thence north-eastwards and curving again north-westwards to the volcanic heights of Kilimanjaro and its neighbours. There is a list in the text of other instances of these " intrazonal " complexes.

A second type of complex, which is dependent upon and predictable from a knowledge of the topographical and hydrographical features of the country, is the " catenary complex " or catena. An area covered by a catena exhibits regular, repeated, alternations in topography with resulting alternations of the vegetational types. Three major catenas are recognized and shown on the map by means of vertical strips of two or more colours, each of which represents one of the main vegetational types referred to above. First, and covering one-ninth of the territory, is the Central Plateau Catena, an undulating peneplain of alternating flat ridges and shallow valleys stretching from the south of Lake Victoria to the foothills of the Southern Highlands at the north limit of Lake Nyasa. The ridges support *Brachystegia*—other species woodland (*miombo*), the valleys are grassland, while an intervening zone of *Combretum*—bushland or wooded grassland occurs. The Ugogo Catena dispersed between Kilosa and Kondoa consists of *Brachystegia*—other species woodland and thornbush. The Masailand Rain-Pond Catena arises from the periodic inundation of low-lying ground which dries out to " pan " areas and the terrain is characterized by dominant thornbush interspersed with islands of grassland surrounded by a fringe of wooded grassland.

The paper goes on to give an account of the hydrographical consequences of the mountain masses and chains, the valleys, scarps and plains forming the topographical plan of the Territory. The vegetational types, natural and induced, are correlated with these features. Tectonic control of the vegetation can be seen to follow topographical and geological features closely, but the wide distribution of *Brachystegia*—other species woodland (*miombo*) which is a striking feature of the map is less obviously explained. The Central Plateau Catena and much of the higher ground north, west and south of the catena area are largely of this vegetational type. This north-western area, however, gives place to a region of grasslands, wooded grasslands, bushland and thicket which is about 60 kilometres wide near Lake Nyasa and expands as it continues north-eastwards into Masailand and Northern Tanganyika, where zones of other vegetational types and the Ugogo and Masailand Catenas disrupt the continuity of the basic pattern. A second large expanse of *Brachystegia*—other species woodland extends across the country from near the coast to

the chain of highlands running from Lake Nyasa to the Usambara Mountains at the north-east limit of the country. *Miombo* occupies mainly terrain over about 1,000 ft. high and occurs on most types of geological formation and soil. Exceptions are poorly draining limestone soils, certain rapidly draining soils and coral limestones of the coastal region. The author attributes the absence of *Brachystegia*—other species woodland in the north to restricted rainfall, particularly the well-marked midsummer dry season which is characteristic of the regions served by the north-east trade wind. *Miombo*-free islands are due to local unfavourable hydrographical rather than chemical differences of the soils.

The map brings out graphically the localized and limited amount of alien occupation and settlement. The extent of the replacement of evergreen forest by grasslands is also shown well and the attendant effects on the efficiency of the denuded watersheds are briefly referred to in the text. The uncoloured map from the author's work "A Population Map of Tanganyika Territory" (1936) is here reproduced and some amendments to it are recorded. This map is mainly concerned to show areas of different types of land occupation and usage.

Appendices compare the present work with earlier maps and definitions of vegetation, and record the sources of information used for the present compilation. An inset to the main map indicates the relative reliability of the information for different areas of the country.

[The manuscript and map of this paper were received for publication a month after the untimely death of the author in 1946. The paper contains the author's portrait in tribute to his memory and the years of arduous and competent study which he devoted to Tanganyika Territory.]

*D. S. Bertram*

Lourenço Marques, Moçambique : Missão de combate as tripanossomíases. Elementos de estudo sobre a biologia das Glossinas de Moçambique. [**Anti-Trypanosomiasis Campaign: the Biology of Glossinae in Mozambique.**] 120 pp., 5 folding maps. 1948. Lourenço Marques : Imprensa Nacional de Moçambique.

This volume contains a series of papers by H. E. Hornby which have been abstracted recently [this *Bulletin*, 1950, v. 47, 20] and a paper by Dr. F. A. Pires (in Portuguese) which is an account of the types of vegetation, the species of tsetse fly and the numbers and condition of the domestic animals kept in parts of the districts of Tete, Beira and Inhambane, Mozambique, from the veterinarian's point of view. The species of tsetse fly mentioned are *Glossina austeni*, *G. brevipalpis*, *G. morsitans* and *G. pallidipes* and their distribution is shown on maps accompanying the paper.

*H. S. Leeson*

Dias, E. Considerações sôbre a importância da moléstia de Chagas em Minas Gerais e estados vizinhos. Necessidade urgente de ser desenvolvido o estudo dessa endemia e de serem tomadas medidas para combatê-la. [**The Importance of Chagas's Disease in Minas Gerais and its Environs. Urgent Need for Combative Measures.**] *Brasil-Medico*. 1949, Aug. 20 & 27, v. 63, Nos. 34/35, 217–20. [16 refs.]

The author voices his lament that though Chagas's disease has been known in Minas Gerais for 40 years and is widely diffused therein and is a common cause of death, practically nothing has been done to bring about its eradication. In as many as 204 municipalities of the State the transmitter is found and in 143 (71 per cent.) of them the Triatomidae are infected with *T. cruzi*.

Records are quoted to show that a high percentage (45 or more) of unselected sera give a positive complement fixation (in Bambuí, Iguatama, Córrego Danta and Campos Altos), and, to epitomize the tests made on sera from Minas, São Paulo and Goiás, 959 were positive of 2,084 examined, or 46 per cent. Cardiopathies are frequent and sudden death from myocarditis is common; from cases followed up in Bambuí four out of five patients die before reaching the age of 50 years, and two-thirds of those between 20 and 50 years die from chronic myocarditis. Of 14 acute cases in children 13 died below the age of 3 years and the other at 7 years.

Methods suggested for dealing with the question come under three heads: 1. Routine, including laboratory diagnosis, examination of *Triatomidae*, rearing of them for xenodiagnosis and such like. 2. Scientific research on the epidemiology of the disease, the cardiopathy, treatment, and the trial of insecticides. 3. Education and propaganda among the medical profession as well as the laity.

*H. Harold Scott*

VON BRAND, T., TOBIE, Eleanor J., KISSLING, R. E. & ADAMS, G. **Physiological and Pathological Observations on Four Strains of *Trypanosoma cruzi*.** *J. Infect. Dis.* 1949, July–Aug., v. 85, No. 1, 5–16, 4 figs. [20 refs.]

In view of the discrepant results obtained by different workers in the treatment of malignant tumours with extracts of *Trypanosoma cruzi*, it was thought that the findings might have been influenced by differences in the strains of the parasite used by them. To test this possibility, the authors made a comparative study of four strains of *T. cruzi* (B,G,W,P), with special reference to their effect upon the growth rate of infected rats, the blood sugar and glycogen content, the degree of tissue invasiveness, the glucose consumption of the trypanosomes, and their behaviour in culture.

The experiments were carried out with 8-day-old rats inoculated intraperitoneally with infected blood. At specified intervals equal numbers of infected and control rats were killed and their blood was collected for blood sugar determination and for assessing the degree of infection. The body of the rat was then cut into pieces and immersed into hot 60 per cent. KOH, and in samples of the dissolved tissues a determination was made of the glycogen, of the reducing sugar after inversion, and of the blood sugar. The infections of tissues were studied in stained sections of various organs. Cultures were made in liquid medium and kept at 24°C. Immediately after inoculation and at subsequent intervals 2 cc. were removed from each culture for determination of sugar and *p*H, and for parasite counts.

The virulence of the four strains, manifested by the time they took to kill the rats, differed considerably. Thus, strain B killed them during the 3rd week of infection, while strain G was not fatal at first but after some months became more virulent, killing them 3–4 weeks after inoculation. On the other hand, strains W and P were never fatal to rats. These strains also differed from each other in the degree of growth retardation produced in the host, in their power to invade and damage its tissues, and in the number of trypanosomes appearing in the peripheral blood, the effects diminishing in the following order: B,G,W,P. A comparison of blood sugar and total glycogen in infected and control rats showed that none of the strains had any pronounced effect on their content. The sugar consumption of *T. cruzi in vitro* was found to be very low or absent, since comparable amounts disappeared from the blood of normal rats.

Observations on cultures revealed no marked differences between the four strains of *T. cruzi*. The flagellates consumed sugar, resulting in acidification

of the medium which, in the case of high initial glucose values, restricted their multiplication. In cultures with medium sugar content acidification was followed by alkalinization, the flagellate population reaching a maximum when the medium again became neutralized. When the initial glucose content was too low to be utilized, only alkalinization took place, and the growth of flagellates was moderate. *C. A. Hoare*

Floch, H. & Abonnenc, E. Sur un trypanosome et un schizotrypanosome de singe évoluant chez les Triatomidés et inoculables aux animaux de laboratoire ; leurs rapports avec *T. rangeli* Tejera, 1920. [**A Trypanosome and a Schizotrypanosome in the Monkey developing in Triatomata and transmissable to Laboratory Animals : their relation to *T. rangeli* Tejera 1920.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 187.* 1949, Mar., 11 pp., 5 figs. [16 refs.]

Floch, H. & Abonnenc, E. Sur *Trypanosoma conorrhini* et sa présence à Cayenne (Guyane française). [*Trypanosoma conorrhini* **in French Guiana.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 181.* 1948, Nov., 8 pp., 3 figs. [18 refs.]

*T. conorrhini* has been recorded from *Triatoma rubrofasciata* in different tropical countries, both of the Old and New World. By inoculation of the insect flagellates into rodents, a number of authors have shown that this trypanosome is a mammalian parasite transmitted by Triatomid bugs. Though its developmental stages show a close resemblance to those of *T. cruzi*, they are distinguishable morphologically, and it is important that a differential diagnosis between these two species should be made in the case of naturally infected Triatomid bugs. Unless this is done some infections with *T. conorrhini* might be attributed to *T. cruzi*, leading to an erroneous impression of the distribution of Chagas's disease.

In their earlier experiments, the authors inoculated rats, mice and guineapigs with the infected faeces of *Triatoma rubrofasciata*, but the results were either negative, or a cryptic infection, detected by xenodiagnosis, was produced. However, inoculation of a very young mouse resulted in a recognizable infection, with scanty trypanosomes in the blood. These measured from 23 to 39 $\mu$ in length, with an average of 32 $\mu$ ; the kinetoplast was large and subterminal, the nucleus was in the anterior part of the body, and a short free flagellum was present.

The authors regard *T. conorrhini* as a rat trypanosome transmitted by Triatomid bugs. In this respect it is like *T. myrmecophagae*, *T. guatemalense* and *T. rangeli*. It is suggested that the first two species are possibly synonyms of the last-named, which has recently been recovered from man [this *Bulletin*, 1948, v. 45, 1072 ; 1949, v. 46, 923]. The blood and insect forms of *T. conorrhini* are depicted in three text figures. *C. A. Hoare*

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## LEISHMANIASIS

Prasad, B. G. **Incidence and Control of Kala-Azar in the Eastern Districts of United Provinces.** *Indian Med. Gaz.* 1949, June, v. 84, No. 6, 269–73, 1 map.

Kala azar has been recognized as occurring in the United Provinces (India) for many years, but it has always been confined to the eastern districts. It was

never a serious public health problem and, even in the most heavily infected districts, Gorakhpur and Benares, only four to five hundred cases were treated annually. However, in 1942 a sharp rise in incidence occurred, and this rise has continued ; in Gorakhpur and Deoria districts the annual numbers of cases treated were 559, 1,263, 3,030, 3,904, 5,200, 8,455, in the years 1942 to 1947, respectively. In other eastern districts which hitherto had been considered free of the disease, it has appeared and shown the same upward tendency ; in Basti district, for example, the treatment figures for these same years have been 42, 35, 100, 243, 281 and 880. Jaunpur was considered almost free from kala azar before 1946, but in 1947, 423 cases were diagnosed, an incidence of 28·5 per 100,000 population. The incidence per 100,000 in the four other most heavily infected districts in 1947 was : Basti 40·4, Benares 99·1, Deoria 85·2 and Gorakhpur 318·0. The incidence in Faizabad was 10·3, and below this figure in Azamgarh, Ballia, Ghazipur, Allahabad and Mirzapur (0·8).

The author personally carried out a detailed survey in a village, Pokhara, in Basti district. The population was 987 and at his visit he diagnosed 22 cases of kala azar. He found conditions very suitable for the transmission of infection by *Phlebotomus argentipes*. [No sandfly survey was reported.]

Even the better class families lived in dark, ill-ventilated insanitary houses in a bad state of repair, with cattle sheds adjoining. In one such family, the richest in the village, there had been 14 recent deaths from a febrile illness with enlarged liver and spleen : the strength of the family was 33 at the time of his visit and there were three cases of kala azar.

Since sandfly control on an effective scale presented great difficulties, the organization of treatment was the main plank in the preventative campaign. " Necessary machinery has been provided in 11 eastern districts through the agencies of 109 fixed and 22 kala-azar travelling dispensaries (of which 11 have started functioning). During 1947, out of 13,665 bloods examined by serum tests, 11,597 were found positive and 11,390 cases were treated. Seven hundred and forty-nine villages were surveyed by the medical officers in charge of kala-azar travelling dispensaries. Thus, a regular anti-kala-azar scheme has been started in the affected districts and a good amount of work is now being done." *L. E. Napier*

Sun, C. J. **" Pentostam " in the Field Treatment of Kala-Azar. A Preliminary Report.** *Chinese Med. J.* Shanghai. 1949, Apr., v. 67, No. 4, 184–8.

Treatment with pentostam was undertaken at several field stations of the Kala Azar Prevention Bureau, Ministry of Health, in China. The patients were all ambulatory and attended the station daily. The drug was given intravenously on four successive days and in a certain number of cases after an interval of ten days two more doses were given on successive days. The daily dose was 2 ml. to infants of five years and under, 4 ml. to children from six to ten years, and 6 ml. for children of 11 years or over and adults, 1 ml. contains " 100 mg. of pentavalent antimony". In all, 510 patients were treated, of whom 338 received four and 172 six injections. The progress towards cure was judged by sternal punctures ; these were carried out after the third injection, when 61 were found negative ; on the fifth day after four injections, when 197 others were found negative ; on the tenth day after four injections, when 209 others, making a total of 467 (or 91 per cent.) were found negative ; and after six injections, 39 of the remaining 43 were found negative.

There were thus only four cases, or about 1 per cent., still showing leishmania at the end of the course of (four or six) injections.

The reactions and complications encountered were comparatively few, were not serious, and subsided after a short rest : there were coughs in 129 cases, diarrhoea in 109, " stomach ache " in 49, nausea in 19, fever in 16, vomiting in 14, vertigo in 12 and various other symptoms each in six or less cases.

*L. E. Napier*

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## FEVERS OF THE TYPHUS GROUP

VAN ROOYEN, C. E. & SCOTT, G. D. **Electron Microscopy of Typhus Rickettsiae.** *Canadian J. Res.* Sect. E. Med. Sci. 1949, Oct., v. 27, No. 5, 250–53, 6 figs. on 3 pls.

The authors describe the appearance of various rickettsiae as seen in photographs taken with the electron microscope after shadow-casting the preparation with chromium. The shadow-casting process produces remarkable results ; the organisms stand out in bold relief and throw shadows which give a clear indication of the thickness of the rickettsiae and of the contours of their upper surfaces.

The authors suggest that it may be possible to differentiate the various species of rickettsiae by their appearance, but there seems to be a wide range of variation in the structural features of the rickettsiae seen in a single small field of the electron microscope.

The authors' interpretation of the photographs agrees in general with that of previous observers who had not the additional help of the shadow-casting process ; they regard rickettsiae as being more nearly related in structure to bacteria than to viruses. Evidence of binary fission was obtained, and the structure of each rickettsia was found to consist of internal dense material surrounded by apparently fluid substance.

There was a remarkable degree of resemblance between *Rickettsia rickettsi* and *R. akari* ; these two organisms also resemble each other in certain antigenic characteristics.

Measurements are given of *R. prowazeki*, *R. mooseri*, *R. burneti*, *R. akari* and *R. rickettsi*. The average length varies from 0·73 $\mu$ for *R. burneti* to 1·2 $\mu$ for *R. rickettsi* and the average width from 0·32 $\mu$ for *R. burneti* to 0·6 $\mu$ for *R. rickettsi*, and *R. akari*.

The six photographs of the above organisms are of great interest, five of them are reproduced at a magnification of 20,000 and one at 45,000.

*John W. D. Megaw*

GÖNNERT, R. Zur Morphologie der Fleckfieber-Rickettsie in der Laus. [**The Morphology of Typhus Fever Rickettsiae in the Louse.**] *Zent. f. Bakt.* I. Abt. Orig. 1947, Oct. 24, v. 152, Nos. 3/4, 203–9, 3 figs. [16 refs.]

The author describes the numerous different forms of *Rickettsia prowazeki* seen in stained films made from the intestines of lice which had been inoculated with infected yolk-sac material by the rectal route.

In the first of the three plates illustrating the protean forms, every letter of the alphabet from A to Z has been needed to designate the different types, and 16 additional forms are shown in the other two plates.

Among the most remarkable of the types are large lightly stained rounded bodies some of which reach a size of more than 4 $\mu$ in diameter. Long threads of 30 $\mu$ in length, and vermicular bodies 10 $\mu$ in length and 2 $\mu$ in width are also shown and described.

The author suggests that the emergence of the more monstrous forms may be due to the abnormal and unnatural conditions prevailing in the previous cultivation of the bodies in yolk sacs. The rounded and vermicular forms are certainly quite different from anything hitherto described as rickettsial bodies. *John W. D. Megaw*

Starzyk, J. O przetrwaniu zarazka duru wysypkowego w terenach endemicznych. [**On Endurance Properties of *R. prowazeki* in Endemic Foci.**] *Przeglad Epidemiologiczny*. Warsaw. 1948, v. 2, Nos. 3/4, 257–9. English summary.

Dried faeces of lice obtained by shaking the sheepskin coats worn by "typhus carriers" were found infective for guineapigs.

These coats were tested from time to time for infectivity to lice and guineapigs after storage in the usual way and were found to be still infected with *Rickettsia prowazeki* when examined 12 months and 23 days later.

The findings are regarded as offering "an explanation of the outbreaks of autumn epidemics of typhus fever after a long summer interval."

*John W. D. Megaw*

Maier, E. H. Beobachtungen bei Fieberzuständen in der Fleckfieberrekonvaleszenz. Beschreibung eines merkwürdigen Nachfiebers bei einem Fleckfiebergenesenden. [**Studies of Febrile Conditions in Convalescence from Typhus Fever.**] *Med. Klin.* 1949, Sept. 23, v. 44, No. 38, 1215–17.

Among six consecutive cases of "after fever" observed in typhus convalescents five were satisfactorily explained. In one there was a small septic focus; in another there was diphtheritic infection which was traced to contact with another patient in the hospital: in two cases malaria parasites were detected; and in the fifth case the cause was amoebic hepatitis.

The case in which the cause could not be discovered was of a most unusual kind; it is discussed at great length by the author, but it does not appear to throw much light on the problem of the "after-fevers" occurring during typhus convalescence. *John W. D. Megaw*

Clavero Del Campo, G. & Perez Gallardo, F. Inmunización contra el tifus exantematico con vacuna viva, cepa E. [**Immunization against Exanthematic Typhus by a Living Vaccine (Strain E).**] 102 pp., 28 figs. [46 refs.] 1949. Madrid: Escuela Nacional de Sanidad.

In this handy little booklet the authors describe the animal experiments and human tests which they carried out in preparing a living vaccine made from Strain E of *Rickettsia prowazeki*, which was isolated in 1941 and was found to have become non-virulent after the 16th egg-yolk passage. The strain has now been passaged 405 times and still retains its freedom from virulence combined with a satisfactory degree of immunizing power.

The immunity conferred on animals by the living yolk-sac suspensions was proportional to the size of the infecting dose, so it was assumed that no multiplication of the rickettsiae occurred in the body.

In the mouse and cotton rat suitable doses of the vaccine produced as high a degree of immunity as was conferred by infection with fully virulent strains.

The vaccine has been given to 2,217 persons between August, 1943, and April, 1944. After single injections given in varying doses of fresh or lyophilized yolk-sac material the Weil-Felix reaction became positive at titres of 1–40 to 1–640 in 46·9 per cent. of the persons tested.

In one case there was a febrile reaction lasting from the 10th to the 21st day after inoculation; this might have been a mild attack of typhus fever, but apart from it there was no reaction of greater severity than the responses often observed after T.A.B. inoculation.

None of the inoculated persons suffered afterwards from typhus fever but no claim is made that the immunizing action of the vaccine in man has been demonstrated. *John W. D. Megaw*

THOMPSON, A. H. **A New Endemic Area of Scrub Typhus in Japan.** *Bull. U.S. Army Med. Dept.* 1949, Nov., v. 9, No. 11, 871–9.

Between October 6 and November 13, 1948, 27 cases of scrub typhus were diagnosed in U.S.A. Army Hospitals in Japan. All the patients were American soldiers; 26 had been engaged in field exercises near the town of Gotemba and only one came from a camp on the slopes of Mount Fuji. Both areas were hilly and were covered with grass, weeds, brush and evergreen trees.

The only evidence of the previous occurrence of the disease in the affected areas was a report of a suspected case in a Japanese soldier from the Mount Fuji area in 1943. The diagnosis in the present cases was based on clinical findings and a rising-titre agglutination of *Proteus OXK*; from four patients rickettsiae were recovered by mouse inoculation.

In an epidemiological investigation carried out in late October and early November, the only significant finding was the occurrence of slight splenic enlargement and peritoneal exudate in mice of the third passage of inoculation with material from one mole shrew and one field mouse. Among the mites collected none belonging to the species *Trombicula akamushi* was found, but the season of prevalence of this mite had already passed.

*John W. D. Megaw*

BENNETT, B. L., SMADEL, J. E. & GAULD, R. L. **Studies on Scrub Typhus (Tsutsugamushi Disease). IV. Heterogeneity of Strains of *R. tsutsugamushi* as demonstrated by Cross-Neutralization Tests.** *J. Immunology.* 1949, Aug., v. 62, No. 4, 453–61.

The present study was carried out on much the same lines and with much the same results as the investigation described by FOX [this *Bulletin*, 1950, v. 47, 27].

Ten different strains of *Rickettsia tsutsugamushi* from different parts of the world were employed in a large series of neutralization tests on mice. As the authors themselves point out, some of the findings were inconsistent; for example Karp-strain antiserum was equally protective against Karp and Seerangayee rickettsiae, but a Seerangayee antiserum of similar potency gave no protection against Karp rickettsiae. Also the neutralization indexes of different antisera against homologous rickettsiae varied greatly; most of them ranged between 2·3 and 5·0, but the index of the Gilliam strain was only 1·2 to 1·6; these latter figures indicated a low degree of protective power. The Pescadores strain of antiserum in one of the sets of tests against homologous serum showed an index of 3·0; in another test it was only 1·7.

The only strains of antisera that appeared to have a wide range of protective power against heterologous rickettsiae were the Buie (New Guinea) and the Volner (Philippines).

Although the results of the tests were not clear-cut they suggested to the authors that each of the strains had "its own individuality", and it was concluded that further investigation is needed to determine whether a monovalent vaccine can be made from a single strain or whether a polyvalent vaccine will be necessary. *John W. D. Megaw*

WHARTON, G. W. **The Vectors of Tsutsugamushi Disease.** *Proc. Entom. Soc. of Washington.* 1946, Oct., v. 48, No. 7, 171–8, 2 figs. [20 refs.]

The author states that the name " tsutsugamushi group " has been vaguely applied to certain mites of the genus *Trombicula*, but he now defines the name as applying only to mites having certain physical characteristics, which he describes and illustrates.

The species admitted to the group are : *Tr. akamushi* Brumpt, 1910 ; *Tr. pallida* Nagayo *et al.*, 1919 ; *Tr. scutellaris* Nagayo, 1919 ; *Tr. intermedia* Nagayo, 1920 ; *Tr. deliensis* Walch, 1922 ; *Tr. fletcheri* Womersley and Heaslip, 1943 ; *Tr. obscura* Womersley, 1944 ; and *Tr. fulleri* Ewing, 1945.

The paper is dated October, 1946, and the bibliography contains no references to publications later than 1945, but the documented summary of the literature up to the time of writing will be useful to workers on the subject.

*John W. D. Megaw*

HARRISON, J. L. **Effect of Rain on the Feeding of the Malaysian Rice-Field Rat.** [Correspondence.] *Nature.* 1949, Oct. 29, 746–7, 1 fig.

*Rattus rattus argentiventer*, the Malaysian rice-field rat, is widely distributed in the Malaysian Islands and is the most important host of *Trombicula akamushi*, the mite-vector of scrub typhus.

Feeding tests indicated that the amount of food taken by the rats from covered baiting points was related to rainfall. This is indicated in a figure showing the bait-take and rainfall for 71 days and in a table which shows the difference of take between a night of rain and a previous night : from the evidence set out, it is clear that prolonged rain at night caused a reduction in the amount of food taken, while rain after some days of drought conspicuously increased it.

Evidently, this rat shows an increased feeding activity after rain, although rain at night reduces the amount of food taken (possibly by reducing the time available for feeding).

The epidemiological importance of this finding lies in the fact that the larval mite is more active in searching for a host when the ground is damp : if, therefore, the increased feeding activity of the rat represents an increase in general activity (which seems likely), then rain after a short drought should increase the likelihood of the mite and its host meeting each other.

*H. J. O'D. Burke-Gaffney*

REISS, F. **Rickettsialpox. A Clinical Review with Differential Diagnostic Notes.** *Chinese Med. J.* 1949, July, v. 67, No. 7, 390–96, 3 figs. [10 refs.]

LACKMAN, D. B., PARKER, R. R. & GERLOFF, R. K. **Serological Characteristics of a Pathogenic Rickettsia occurring in *Amblyomma maculatum*.** *Pub. Health Rep.* Wash. 1949, Oct. 28, v. 64, No. 43, 1342–9, 3 figs.

This paper must be read in full by all workers on the antigenic structure of the typhus rickettsiae. The authors describe a study of a rickettsia recovered from specimens of the tick, *Amblyomma maculatum*, collected in Texas, Georgia and Mississippi. The name maculatum strain has been given to the rickettsia, which, while belonging definitely to the Rocky Mountain spotted fever group, is less virulent for rabbits and guineapigs than most of the strains recovered from *Dermacentor variabilis* and *D. andersoni*. Complement-fixation tests show that the maculatum strain is not identical with any other known rickettsia belonging to the Rocky Mountain fever group.

Maculatum antiserum tested against various antigens made of washed rickettsial suspensions gave the following fixation titres. The titres observed when homologous antisera were tested against the same antigens are shown in brackets for comparison.

North Queensland tick typhus, 0 (126) ; South African tick bite fever 8 (64) ; Rocky Mountain spotted fever 14 (240) ; Rickettsialpox, 4 (166) ; Maculatum antiserum (328).

When the tests were carried out with soluble antigens instead of washed rickettsial suspensions the differences between the titres were much less ; in each case the titre usually observed with homologous antiserum was only about two to four times higher than the maculatum titre.

[These differences in the antigenic structure of various strains of tick-borne typhus seem to be comparable with the differences observed in strains of mite-borne typhus.] *John W. D. Megaw*

Ortiz Mariotte, C. & Varela, G. Cultivo del *Rhipicephalus sanguineus* en el laboratorio y vacuna hecha con esta Garrapata. [**The Preparation of a Vaccine against Tick Typhus from** *Rhipicephalus sanguineus* **bred in the Laboratory.**] *Medicina.* Mexico. 1949, Aug. 25, v. 29, No. 586, 323–35, 9 graphs. English summary.

The authors state that the employment of ticks in the preparation of a vaccine against tick-borne typhus has the following advantages over the yolksac method: (1) Simpler equipment is needed; (2) suitable ticks are less expensive, easier to maintain, and more convenient for handling than fowl eggs ; (3) a smaller staff of technicians is needed and ; (4) the vaccine probably retains its efficacy for a longer period than the yolk-sac vaccine.

*R. sanguineus* is preferred to *Dermacentor andersoni* and *Amblyomma cajennense* because it does not readily bite human beings and so is less dangerous to handle.

The vaccine gives good protection to guineapigs and is recommended for use in the areas in which " spotted fever " is endemic. *John W. D. Megaw*

Carson, Merl J., Gowen, L. F. & Cochrane, F. R. **Rocky Mountain Spotted Fever treated with Chloromycetin : Report of Two Cases.** *J. Pediatrics.* 1949, Aug., v. 35, No. 2, 232–4.

Two children aged three and five years were treated with chloromycetin for severe attacks of Rocky Mountain spotted fever.

The initial dose was 1·0 gm. for the younger child and 1·25 for the elder and the further dosage was 0·25 gm. every three hours till three days after defervescence. The younger child became afebrile 60 hours after the initial dose, which was given on the 5th day of the fever ; the older child's temperature fell to normal 80 hours after the first dose, given about the 8th day of the fever.

A curious feature was the occurrence of positive Weil-Felix reactions at a titre of 1–1,280 with *Proteus OX19* and *Pr. OXK* in both cases, five days after admission, but not earlier. *John W. D. Megaw*

Bonis, M. Un cas de fièvre boutonneuse authentique à Arcachon. [**A Confirmed Case of Boutonneuse Fever at Arcachon, France.**] *J. Méd. de Bordeaux.* 1949, Nov., v. 126, No. 11, 534–7.

The most interesting feature of this case is the occurrence of a positive rickettsia-agglutination reaction against *Rickettsia prowazeki* at a titre of

1–160 during the fourth week, and at a titre of 1–640 ten days later; the corresponding titres for *R. conori* were 1,320 and 1–2,560. The tests were carried out by Dr. Paul Giroud.

The clinical and epidemiological features pointed strongly to an attack of boutonneuse fever, probably transmitted by *Rhipicephalus sanguineus*.

*John W. D. Megaw*

See also p. 279, SMITH, COLE, JONES & CLARK, **Investigations of Tick Repellents at Camp Bullis, Texas, 1948.**

MACCALLUM, F. O., MARMION, B. P. & STOKER, M. G. P. **Q Fever in Great Britain. Isolation of *Rickettsia burneti* from an Indigenous Case.** *Lancet.* 1949, Dec. 3, 1026–7. [10 refs.]

A strain of *Rickettsia burneti* was isolated from the blood of a pathologist who was attacked by Q fever 18 days after carrying out an autopsy on the body of an old man aged 78 who was found by retrospective evidence to have died of Q fever.

The old man must have been infected at his home in a coastal town of South-East England because *Rickettsia burneti* was recovered from raw milk from some of the local farms, and serological evidence was obtained of the existence of infection among cattle, farmers, and dairy workers in the neighbourhood.

In three of the other cases described in the following paper the patients had also been present at the autopsy and they were attacked about the same time as the pathologist mentioned above.

The authors call attention to the need for care in handling the organs of persons who have died of pneumonia and in removing serum from blood clot in cases of atypical pneumonia.

*John W. D. Megaw*

HARMAN, J. B. **Q Fever in Great Britain. Clinical Account of Eight Cases.** *Lancet.* 1949, Dec. 3, 1028–30, 3 figs.

The five cases mentioned in the preceding paper form a definite group. The first was the old man who died after an illness lasting 11 days. The onset of the attack was on June 14, 1949, nearly three weeks after admission to hospital for the investigation of a condition which turned out to be bulbar palsy.

At the autopsy on June 25 signs of cerebral degeneration were found and the lungs showed naked-eye and microscopical changes characteristic of Q fever.

The wife of the patient was interviewed later; she gave a history of a recent attack of fever and her serum gave a complement-fixation reaction with *R. burneti* antigen at a titre of 1–320.

About July 9 a mortuary attendant who had assisted at the autopsy was attacked: his fixation titre on September 1 was 1–640.

On July 10 a nurse who had nursed the first patient and had laid out his body fell ill; her fixation titre rose from 1–10 on the 10th day to 1–320 on the 30th day.

About July 11, the pathologist from whose blood *R. burneti* was isolated began to feel malaise; three days later his temperature was found to be 103°F. and he had a rather severe attack in which repeated rigors, drenching sweats and slight nocturnal delirium were prominent features.

About the 10th day of the illness chloramphenicol (chloromycetin) was given; the initial dose was 3·5 gm. and further doses of 0·25 gm. were given every three hours for 36 hours. The response was highly satisfactory. The fixation titre was 1–10 on July 21 and 1–640 on August 9.

Another pathologist who had been present at the autopsy suffered from severe abdominal pains from July 1 to July 13, when the pains became worse and

the temperature rose for a day or two. The fixation titre was 1–60 on September 1, and it was suspected that the febrile stage of the illness was a short attack of Q fever.

Two other persons, a physicist and his wife, were attacked on September 8th and 9th. Their fixation titres were less than 1–10 early in the illness and rose to 1–80 at a later stage. No connexion with the other cases could be discovered. *John W. D. Megaw*

KIKUTH, W. & BOCK, Marianne. 23 Fälle von Laborinfektionen mit Q-Fieber [**Twenty-three Cases of Laboratory Infection with Q Fever.**] *Med. Klin.* 1949, Aug. 19, v. 44, No. 33, 1056–60, 1 fig.

Early in February, 1948, the author began a study of the strain of rickettsia isolated by HERZBERGER in 1946 and identified by NAUCK and WEYER as *Rickettsia burneti* [see this *Bulletin*, 1949, v. 46, 626].

Within two weeks one of the workers was attacked by Q fever, and up to August 1948, attacks occurred in 22 other workers in the laboratory.

Infection was regarded as being, almost certainly, by the inhalation of infected particles; the authors mention that they found evidence of the occurrence of accidental air-borne infection of the same kind among their laboratory animals and as the attacks were often inapparent their occurrence is regarded as being likely to give rise to fallacies when inoculation experiments are being carried out.

There was no case of transmission of infection from any of the patients despite the fact that no steps were taken to isolate the infected persons.

*John W. D. Megaw*

MAROC: RAPPORT SUR LE FONCTIONNEMENT DE L'INSTITUT PASTEUR, ANNÉE 1948. pp. 3–8. Rickettsioses. [**Rickettsial Diseases.**]

The greater part of the section of this report dealing with rickettsial diseases consists of a description of the radioscopic findings in five persons experimentally infected by the nasal route with *Rickettsia burneti*. In three of the cases the inoculation is described as being by "intranasal injection"; in the other two it was by "aerosols introduced with the help of a gas-mask."

The lesions produced were similar to those occurring in cases of natural infection; one of the two persons infected by aerosols gave no reaction of any kind. One of the men who conducted the aerosol experiments became infected and had a typical attack of Q fever with pulmonary complications.

The bovine tick, *Hyalomma mauritanicum*, has been found naturally infected in Algeria and southern Morocco.

From a pool of 40 *Rhipicephalus sanguineus* in Morocco, *Rickettsia conori* was isolated and also *R. burneti*.

Mention is made of a strain of murine-typhus rickettsiae, TMC III, which has been maintained since January 1933, and has been passed 812 times through guineapigs up to December 30, 1948. *John W. D. Megaw*

DE RODANICHE, Enid C. **Experimental Transmission of Q Fever by** *Amblyomma cajennense*. *Amer. J. Trop. Med.* 1949, Sept., v. 29, No. 5, 711–14.

The author has transmitted Q fever in the laboratory from guineapig to guineapig by the bites of larval, nymphal, and adult ticks of the species *Amblyomma cajennense*. The ticks were infected in the larval stage by feeding on a guineapig which had been infected with *Rickettsia burneti* by intraperitoneal inoculation.

A suspension made from the larval progeny of one of the infected ticks was not infective to the two guineapigs on which it was tested by intraperitoneal inoculation. *John W. D. Megaw*

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## BARTONELLOSIS

RICKETTS, W. E. **Clinical Manifestations of Carrión's Disease.** *Arch. Intern. Med.* 1949, Nov., v. 84, No. 5, 751–81, 9 figs. [Refs. in footnotes.]

An excellent account of bartonellosis in man, starting with the interesting story of verruga peruviana, the cutaneous manifestations, the connexion of which with the severe anaemia of Oroya fever was unsuspected until Daniel Carrión, a medical student, sacrificed his life by self-inoculation and proved the identity. By the way, Oroya fever is a misnomer for, though the first cases were observed among men engaged in constructing the Lima-Oroya railway, they did not occur in Oroya itself.

The article comes from the Frank Billings Medical Clinic, in the University of Chicago, and was, one imagines, a clinical lecture on Carrión's disease. If it was not, it ought to be, for the description is clear and graphic and the illustrations well chosen and well reproduced. Clinically, the stages of incubation, invasion, pre-eruption and eruption and the relapses of the anaemia and, what is often overlooked, the mental and nervous symptoms, due to encephalopathy and, at times, to involvement of the peripheral nervous system, are each described in detail. Immunity after an attack varies in degree and extent; sometimes it is short-lived, in other cases it would seem to be life-long. The bad prognosis is largely due to intercurrent infection of intestinal origin, consequently more happy results may be hoped for from the use of penicillin and streptomycin. Hitherto, treatment has been purely symptomatic and the outlook very uncertain. *H. Harold Scott*

RICKETTS, W. E. **A Study of 22 Cases of Carrion's Disease with Intercurrent Malaria.** *Amer. J. Med. Sci.* 1949, Nov., v. 218, No. 5, 525–30, 3 figs. [15 refs.]

Of the 22 cases referred to, *Plasmodium vivax* was present in 18 and the other two plasmodia in two each. Three of the patients were shown to have malaria after the *Bartonella* anaemia had set in, another three during the pre-eruptive stage and the remaining 16 during the eruptive verruga stage. In the last, the malaria attacks were usually typical, but the verruga might become quickly less swollen and even disappear; if they re-appear the bone and joint pains recur also. Enlargement of the spleen, which is not a characteristic of Carrión's disease, was present in all but two of the patients.

Six of the cases are recorded in detail. In two the malarial attacks occurred during the eruptive stage and in one at least the two infections had probably been acquired at the same time. A third patient had a marked bartonellosis anaemia, with red cells down to two million per cmm., leucocytes 8,300 and Hb 12·6 gm.; 58 per cent. of the white cells were lymphocytes. This patient showed a *P. vivax* infection two months after he had contracted the bartonellosis. In the fourth, Carrión's disease and malignant tertian malaria appeared to have been contracted simultaneously. The fifth showed a severe grade of anaemia with red cells down to 1,130,000 per cmm., but *Bartonella* were few and improvement took place, the count rising to 2,110,000. Fever, however, returned and the corpuscles again fell, to 1,700,000 and *P. vivax* was found. Recovery followed treatment by quinine and atebrin [mepacrine]. In the sixth, a *Bartonella*

anaemia was succeeded by a *P. vivax* infection, resulting in a transient drop in red cells from 2·07 to 1·43 millions per cmm. After treatment with quinine the red cells rose to 4·4 millions and the Hb to 15 gm.

In some of the patients it was observed that the *Bartonella* disappeared from the corpuscles as the malaria parasites increased in number.

[The subject of the antagonism between concomitant infections is a most interesting one and it is a pity that it has not been more studied. The abstracter published a paper on concomitant malaria and enteric fever some 30 years ago, showing that the two infections, in a country where each had a high fatality rate, when present together caused so little disturbance that the patient could with difficulty be persuaded to remain in bed. See this *Bulletin*, 1920, v. 15, 252.] *H. Harold Scott*

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## YELLOW FEVER

SMITHBURN, K. C., GOODNER, K., DICK, G. W. A., KITCHEN, S. F. & ROSS, R. W. **Further Studies on the Distribution of Immunity to Yellow Fever in East and South-East Africa.** *Ann. Trop. Med. & Parasit.* 1949, Oct., v. 43, No. 2, 182–93, 5 figs.

An earlier report [this *Bulletin*, 1947, v. 44, 72] has described the results of surveys of immunity to yellow fever carried out in Central and East Africa before 1944. The present paper is concerned with new surveys carried out from 1944 to 1948 in Kenya, Tanganyika, Northern Rhodesia, Nyasaland, Southern Rhodesia, Mozambique, Bechuanaland and Swaziland, with the addition of small surveys in Egypt, Arabia and Somalia.

Studies of this kind depend very largely on the interpretation of the laboratory tests for neutralizing antibodies in the sera. Here a sensitive method was used, involving the mixing of undiluted serum with 1 per cent. mouse-brain-passage neurotropic yellow fever virus, and inoculating this intraperitoneally into groups of infant mice. If older mice were used they received in addition 2 per cent. starch solution intracerebrally. Two assumptions must be made. First, that protection of mice under these conditions invariably indicates the presence of specific antibodies in the sample of serum [such an assumption would for instance not be valid in the analogous instance of surveys for Newcastle disease]; and second that subclinical or unrecorded infections are sufficient to give rise to a grade of immunity demonstrable with this technique. In order to avoid the difficulty of inadvertently obtaining sera from those who had received yellow fever vaccine, the collection of blood was confined to women and children in these areas. Immune persons were found from every country sampled except Arabia and Swaziland, though the few immunes found in Egypt are regarded critically and their significance awaits further sampling.

Among the countries sampled the incidence of immunity to yellow fever was highest in Northern Rhodesia, along the Zambesi River.

The results show that yellow fever has occurred much further to the south in Africa than was previously supposed. The authors emphasize that the large migrations of labourers into the Union of South Africa may serve as a means of dispersing yellow fever from endemic foci, and may constitute a serious health hazard to the Union. They advise preventive inoculation of all immigrant labourers before they enter the Union and as near to their homes as possible. *Forrest Fulton*

HADDOW, A. J. & MAHAFFY, A. F. **The Mosquitoes of Bwamba County, Uganda. VII. Intensive Catching on Tree-Platforms, with further Observations on *Aëdes* (*Stegomyia*) *africanus*, Theobald.** *Bull. Entom. Res.* 1949, Aug., v. 40, Pt. 2, 169–78. [10 refs.]

This paper continues the account of the research on the transmission of yellow fever in Bwamba County, Western Uganda [see this *Bulletin*, 1947, v. 44, 992].

A series of catches of mosquitoes was made in the forest canopy in two places during the sunset period for 11 weeks in April, May and June 1945. *Aëdes africanus* preponderated in both areas ; at Mamirimiri, at levels ranging from 22 to 82 feet above the ground, 1,463 (60 per cent. of total culicines) were taken in 2,251 man-hours and at Mongiro, where the platforms were between 50 and 60 feet, 2,113 (69 per cent. of total culicines) were taken in 3,158 man-hours. Other common mosquitoes were *Taeniorhynchus africanus* and *Anopheles gambiae* ; there were also large numbers of a Tabanid, *Chrysops centurionis*. Two *Aëdes aegypti* were taken at Mamirimiri and 13 at Mongiro though there were few African huts and the nearest was half a mile away. *Aëdes africanus* was the only mosquito taken every night but the numbers fluctuated, the poorest catch being five and the best 236 ; it was noted that poor catches occurred on chilly nights and that wind puts an end to biting activity altogether.

In an unsuccessful attempt to transmit yellow fever to a susceptible animal by bite, large numbers of *Aëdes africanus* were fed individually on a non-immune rhesus monkey ; they engorged rapidly and sometimes completely in half a minute. Of 3,323 mosquitoes, 2,883 (87 per cent.) fed and 2,808 (85 per cent.) became fully engorged. Suspensions of 4,553 mosquitoes (*Aëdes africanus*, " other *Aëdes* ", and *Taeniorhynchus* spp.) were inoculated into rhesus monkeys and *Aëdes aegypti* into mice. Virus was not obtained.

As the result of a study of a large sample of *Aëdes africanus* and *Aëdes luteocephalus* the conclusion was reached that the morphological differences between these two mosquitoes are not great enough to warrant full specific rank for *Aëdes luteocephalus*. *H. S. Leeson*

BATES, M. **The Development and Longevity of *Haemagogus* Mosquitoes under Laboratory Conditions.** *Ann. Entom. Soc. of America.* 1947, Mar., v. 40, No. 1, 1–12. [24 refs.]

These mosquito studies were concerned entirely with the population of *Haemagogus* existing at Villavicencio, Colombia. In earlier papers the species was referred to as *H. capricorni* but it is now known as *H. spegazzinii falco* [this *Bulletin*, 1946, v. 43, 599]. It has been possible to establish laboratory colonies of some species of *Haemagogus* but not of *falco*. These experiments therefore were made with captured adults or with first generation material from such adults.

After many trials it was found most convenient and satisfactory to rear larvae in tap-water containing brewer's yeast and sometimes to keep the larvae in individual tubes. The conventional cage method of keeping adult mosquitoes alive failed with *Haemagogus*. The method eventually adopted was to keep the mosquitoes separately in tubes measuring 25 × 50 mm. [not cm. as stated] supplied with sugar water as food, with moist cotton in the tubes and to maintain them in moving air having a relative humidity of 70 per cent.

The chief points investigated were the effect of temperature on the rate of development of the mosquito from egg to adult ; on the size of the adults ;

on the longevity of the adults and on the development of the yellow fever virus in them.

At a constant temperature of 20°C. development of the mosquitoes to the adult stage required 26 days ; they were larger and hardier than mosquitoes reared at higher temperatures, but attempts to obtain transmission of the virus failed. The mean survival time was 19·4 days. At 25°C. the life cycle took 18 days and the average adult survival time was 18·3 days, but the minimum incubation period for the virus was 28 days. Routine transmission experiments were conducted at 30°C., at which temperature the mosquito life cycle required 12·5 days, incubation of the virus took ten days and mosquitoes survived 13·8 days. When the temperature was maintained at 25°C. for 20 hours and then at 35°C. for four hours daily (a mean of 26·6°C.), the mosquito life cycle was completed in 15 days, incubation of the virus took 12 days and the mosquitoes survived 14·5 days. At 35°C. attempts to rear *Haemagogus* larvae failed, transmission of the virus could not be obtained and the adult mosquitoes lived only 4·8 days.

The author discusses the relation between these results and the habits of the mosquitoes in nature and concludes that conditions associated with the 25–35°C. alternation of temperature are probably most favourable for *Haemagogus spegazzinii falco* and for the yellow fever virus.

*H. S. Leeson*

EDWARDS, J. C. *Aedes aegypti* **and other Mosquito Control Measures in Port Sudan.** *J. Roy. San. Inst.* 1949, Nov., v. 69, No. 6, 718–20.

In 1940 a serious epidemic of yellow fever occurred some 600 miles from Port Sudan in the Kordofan province (14°N 30°E) of the Sudan [this *Bulletin*, 1942, v. 39, 69] ; as a result the northern boundary of the endemic zone of yellow fever in this part of Africa was declared to be the 15°N parallel of latitude eastwards to the Eritrean boundary and thence along this northern limit of Eritrea to the Red Sea, at a point some 150 miles south of Port Sudan. This port was in direct communication with the endemic zone by railway, sea and air transportation, and also by sea and air with Arabia and the then strategically important Middle East. The Sudan Medical Service realized the necessity of endeavouring to eliminate potential yellow fever vector mosquitoes, particularly *Aëdes aegypti* from Port Sudan and its vicinity (population 51,000). The principal breeding places were the drums kept by householders and shopkeepers for water cooling and storage. A " dry-day " system had been in force since 1937, but a careful inspection revealed that lack of adequate supervision had been followed by an increase in *Aëdes* population, shown by an *Aëdes* index of 50 per cent. in certain districts. The number of mosquito workers was increased steadily till in 1943 thirty-four were employed, including two ship searchers, one dhow searcher, and two men on aircraft quarantine duties. Their efforts resulted in a fall of the index to 2 per cent. in 1943 and nil after 1946.

Quarantine regulations were instituted in 1944, whereby dhows were required to have all fresh water tanks of an approved mosquito-proof pattern. Ships, arriving within six days from ports in the endemic yellow fever zone, were treated as " suspected " ships under regulations in agreement with the International Sanitary Convention of 1926. Aircraft arriving from the endemic zone were treated with insecticide and inspected. Trains from the interior were similarly treated at a station four hours distant from Port Sudan and inspected on arrival.

These measures have been continued to the present time with the result that, during the past three years, two areas, each of 500-metre radius, round the main quays and airfield respectively, have been kept entirely free of *Aëdes* mosquitoes.

*R. Ford Tredre*

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## RABIES.

BRICEÑO ROSSI, A. L. Un case de rabia humana. [**A Human Case of Rabies.**] *Rev. Grancolombiana de Zoot., Hig. y Med. Vet.* Caracas. 1949, Jan.–Mar., v. 3, Nos. 1–2–3, 222–5.

The following is a translation of the author's summary :—

Record of the first human case of rabies in Venezuela in which the clinical diagnosis was confirmed by isolation of rabies virus.

*H. J. O'D. Burke-Gaffney*

BARTEL, H. Zur Diagnostik der Tollwut. [**The Diagnosis of Rabies.**] *Zent. f. Bakt.* I. Abt. Orig. 1947, Oct. 24, v. 152, Nos. 3/4, 155–9.

The author begins by critically considering the usual eosin-methylene blue method of staining when examination of tissue is undertaken for finding Negri bodies. He says that in some 4 per cent. they are absent, at least not found, though rabies is present as shown by animal inoculation. This last necessitates in some cases a long delay, three months or even more, before a negative can be pronounced with certainty. Where human life is at stake—and failure to diagnose the possibility and so start treatment in time may mean death—early diagnosis is all-important and this entails greater certainty of finding Negri bodies in the brain of the infecting animal. The original Lentz method must be followed strictly, the use of eosin extra B and methylene blue B-patent, Höchst. Also it must be borne in mind that the eosin tends to be thrust out (*verdrängt*) by the methylene blue so the staining by each should be prolonged. Next, Lentz's recommendation of *alkaline* alcohol must be attended to ; he used absolute alcohol 6 gm. with one drop of 1 per cent. caustic soda. The author suggests an alcohol with *p*H 8·0–8·5. Next, sections must be thin, 4–6 $\mu$. Again, many pathologists pass the tissue direct from acetone to paraffin. This is bad because the two do not mix and shrinkage and vacuolation occur ; passage through xylol should intervene between the acetone and the paraffin. Yet again, it is found that the Negri bodies show up better after preliminary treatment with acetic acid and this is obtained by using Carnoy's fluid as fixative. This consists of absolute alcohol 60 cc., chloroform 30 cc., acetic acid 10 cc., and the tissue must not be left too long in this or it becomes shrivelled and hard.

The details of the procedure are : To take portions of the brain tissue 2–3 mm. in thickness ; place for one hour in Carnoy's fluid, then in the following in succession, each stage occupying half an hour : absolute alcohol ; absolute alcohol and xylol in equal parts ; xylol ; soft paraffin ; hard paraffin.

In 27 out of 28 cases thus examined in 1944, Negri bodies were found and the only failure was one in which decomposition was advanced and the tissue autolysed.

For experimental inoculation time is saved, says the author, by injecting the suspended material, not by a trephine opening, but by a hollow needle about 4 mm. in length.

*H. Harold Scott*

i. Fischl, M. **The Management of Bitten Persons.** *Harefuah.* Jerusalem. 1949, Sept. 15, v. 37, No. 6. [In Hebrew 67–70. English summary 70–71.]

ii. Sulman, F. G. **Human Rabies in Israel and the Organisation of Treatment Centres.** *Ibid.* [In Hebrew 71–2. English summary 73.]

iii. Silberstein, W. **Prophylactic Vaccination against Rabies.** *Ibid.* [In Hebrew 73–5. English summary 75.]

iv. Goor, S. **Rabies in Animals in this Country and its Control.** *Ibid.* [In Hebrew 76–7. English summary 77.]

i. In the first of these papers special emphasis is laid on local treatment (cauterization of the wound), which is regarded as the most effective single measure in the prevention of rabies in persons at risk.

The author feels that in view of the great danger of post-vaccinal " neuro-paralytic accidents", Pasteurian treatment should be given only when it is definitely indicated. He finds that one-half of the 14 accidents of this nature which occurred in Palestine between 1913 and 1948 could have been avoided, had treatment been limited to persons actually at risk.

In comparing the figures given in the League of Nations' reports with the incidence of paralytic accidents in Palestine the author finds corroboration of the view, first expressed by Babès, that Jews are particularly liable to this complication of anti-rabies treatment. The respective percentages for cases of post-vaccinal paralysis are : 0·039 for Palestine and 0·017 for all cases included in the League of Nations' reports. For deaths due to paralytic accidents the respective percentages read 0·011 and 0·004.

ii. In the second paper it is stated that rabies has always presented a considerable problem in Palestine, 3 to 10 persons dying annually of the disease. At present decentralization of treatment at 60 centres is practised. Stress is laid on the value of local treatment with fuming nitric acid. Two cases of what are called " abortive attacks of rabies " are described. The first occurred in 1921 and the second in 1948. In the latter case a boy of 9 years of age was bitten by a cat and received a full course of anti-rabies treatment. During this period he suffered from allergic reactions. Six weeks after the date of bite, the patient showed the following symptoms : laryngeal spasm aggravated by the sight of water (hydrophobia) and extreme salivation. The spasms subsided after one day and the salivation after two days. The boy recovered. [It would seem desirable that such a statement should be subject to most careful consideration, in view of the fact that abortive rabies in man has not, to the reviewer's knowledge, previously been proved. The situation would be different had positive animal experiments been carried out with the child's saliva.]

iii. In the third paper the author gives a historic review of Pasteurian treatment and describes the several methods of vaccine preparation currently employed. [In this connexion one statement reading " by exposure to ultra violet light the virus is not completely destroyed " is open to question. This method will completely inactivate the rabies virus, but will not impair its antigenic potency.] Reference is also made to Habel's method of testing vaccines—a method criticized by Remlinger and others.

iv. In the fourth paper it is stated that in Palestine, during the 8 years' period 1930–1937, rabies was diagnosed in 2,207 animals, of which 67 per cent. were dogs, 12·3 cats, 10·3 jackals, the remainder being mostly equines and cattle. The disease was more prevalent during winter and spring than in summer, and more prevalent in the populated coastal plain than in the interior of the country.

It is the intention of the Veterinary Service in Israel to set up 4 centres, in Tel-Aviv, Haifa, Jerusalem and Tiberias, for the detention and observation of biting animals. Control measures against rabies will be strictly enforced and compulsory vaccination of dogs shortly begun. *G. Stuart*

SILBERSTEIN, W., GERICHTER, C. B. & RABINOWITZ, K. **Efficiency of Locally produced Anti-Rabies Vaccine.** *Harefuah*. Jerusalem. 1949, Nov. 15, v. 37, No. 10. [In Hebrew 135–6. [10 refs.] English summary 136].

The English summary appended to the paper is as follows :—

" War time conditions caused a slight rise of the death rate of rabies in Israel. To lift any doubt on the efficiency of the locally produced Anti-Rabies Vaccine, (2% emulsion of rabbit brain in 0·5% phenol) the Mouse Protection Test as advised by *Habel & Wright* (1948) was carried out. As result it could be shown that the vaccine produced in the Government Central Laboratories protects white mice against 1521 $LD_{50}$ of virulent fixed virus (the internationally required standard being 1000 $LD_{50}$)."

ÇILESIZ, A. Türkiyede Semple usulü ile Kuduz aşisi tatbikati ve 16 senelik (1933–1948) neticeleri. [**Results of 16 Years' Anti-Rabies Treatment in Turkey by the Semple Method (1933–48).**] *Türk Ijiyen ve Tecrübi Biyoloji Dergisi*. Ankara. 1949, v. 9, No. 2, 24–53. [14 refs.] French summary 54–6.

Between 1933 and 1948 there were 55,219 persons treated at the Turkish Central Institute of Hygiene and its 82 branches. During this period, 70 failures of treatment and 11 cases of post-vaccinal " paralytic accidents " were recorded : two of the latter ended fatally.

In respect of the total number treated, animal species were incriminated in the following percentage frequency : dogs 75 ; cats six ; solipeds three ; ruminants three ; jackals one ; and wolves 0·4. In all, 2,345 persons received treatment because of contact with rabid human beings ; of that number, six had actually been bitten. Of the 70 treated persons who died, 33 had been bitten deeply, 36 superficially, 62 through the bare skin, seven through clothing, 30 on the head, 26 on the arm and 13 on the foot. One fatal case showed, at the time of treatment, no lesion.

Results of treatment begun at any time within the first 21 days of the date of biting did not differ appreciably—a finding which had already emerged from the reports of MCKENDRICK [this *Bulletin*, 1940, v. 37, 616] and GREENWOOD [*ibid.*, 1947, v. 44, 636] and which constitutes one of the reasons why the value of anti-rabies treatment remains in doubt. It was only when treatment was delayed beyond the 21-day period that its outcome was substantially influenced. [It is unfortunate that the incubation periods of the fatal cases are not given and that the times when treatment was started cannot therefore be correlated therewith.] *G. Stuart*

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## PLAGUE

SEAL, S. C. **Epidemiology of Plague with reference to the Present Calcutta Outbreak.** *Calcutta Med. J.* 1949, June & July, v. 46, Nos. 6 & 7, 167–78 ; 218–32, 4 graphs, 6 charts & 2 maps.

The author, in collaboration with LAL, has already described the epidemiological features of the outbreak of plague in Calcutta in 1948 [see this *Bulletin*,

1949, v. 46, 33]. The alarm caused by the reappearance of the disease after an absence of 22 years has been increased by the earlier seasonal recrudescence in 1949 as compared with 1948, and the somewhat higher case mortality rate, about 18 per cent. against 13·3 per cent. in 1948. The number of cases at the time of writing was already 179 as compared with 173 during the whole of 1948 and fresh cases were still being reported. The higher mortality rate in 1949 seems to be accounted for by the occurrence of 14 cases of pneumonic plague, of which 13 were fatal. These pneumonic cases are said to have caused special consternation among medical men, but the author rightly points out that this form of plague is more easily controlled, and is of less epidemiological significance, than bubonic plague ; he advises the immediate administration of a course of sulphadiazine (2 to 4 grammes daily for four days) to all who have come into contact with pneumonic cases, and suggests that the patients should be given a dose of at least 1·0 gm. of streptomycin before being removed to hospital.

Taking into account all the known factors the conclusion of the author is that there is " a strong probability of the extension of the present outbreak ", but it is also suggested that by the timely use of DDT, plague vaccine, and anti-rat measures, there is every hope of preventing a major epidemic.

[In a good summary of the history of plague the discovery of the bacillus is attributed to Kitasato and Yersin, but the organism described by the former observer differed in certain essential respects from *Pasteurella pestis* so that Yersin alone is now regarded as being entitled to the credit for the discovery.

By an unhappy misprint the date of the discovery is shown as 1854 instead of 1894.] *John W. D. Megaw*

MATUMOTO, M. **Studies on *Pasteurella pestis*. I. Biochemistry of *Pasteurella pestis*, with special reference to Fermentation Reactions.** *Japanese Med. J.* 1948, Dec., v. 1, No. 6, 484–93. [39 refs.]

The biochemical reactions of 69 strains of *Pasteurella pestis* were studied and the results compared with the findings of 39 other workers.

The results are summarized as follows :—

Indol—; $H_2S$—; reduction of nitrates to nitrites+; no change or slight acid without clot in milk.

*Fermentations.*

Negative :—amygdalin, dulcitol, erythritol, inositol, inulin, raffinose, saccharose and sorbitol.

Positive :—dextrose, galactose, laevulose, mannitol, mannose.

Usually positive but rarely negative :—arabinose, maltose and xylose.

Negative or positive :—glycerin, rhamnose.

Lactose not fermented or very slowly fermented.

Inconstant results :—adonitol, dextrin, glycogen salicin, starch and trehalose.

A table summarizes the fermentation reactions of the 69 strains and shows the differences in the reactions of some of the strains. Comments are made on the occasional differences in findings reported by others.

The author notes that as some strains of *Past. pestis* ferment glycerin and some do not, the test of fermentation of glycerin for the differentiation of *Past. pestis* and *Past. pseudotuberculosis* is invalid. His observations, however, support the finding of KURAUTI that there is a relationship between glycerin fermentation and the geographical distribution of strains of *Past. pestis*.

*J. Taylor*

FAVAREL, R. Agglutination de *Pasteurella pestis* par le sérum des pesteux (peste bubonique et peste pulmonaire). [**Agglutination of *Pasteurella pestis* in Bubonic and Pneumonic Plague.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 7/8, 335–8.

After tests of various cultivated strains of plague bacilli the author succeeded in finding one suitable for the preparation of a saline suspension for agglutination tests.

In nine cases of bubonic plague in which treatment [presumably with sulphonamides] had been started at an early stage, agglutinins were first detected about the seventh day and the titres were relatively low (1–20 to 1–160). So also two cases of pneumonic plague treated with sulphonamides and two treated with streptomycin gave titres of 1–20 except for one of the cases treated with streptomycin in which it rose to 1–160.

In two " untreated " cases of bubonic plague, the titre rose to 1–640.

In two treated bubonic cases retrospective tests were carried out nine and ten months after the attacks ; the reactions were negative.

Positive reactions, even at low titres, were found to be significant, except perhaps in recently inoculated patients. The test is regarded as being specially useful in the retrospective diagnosis of recent attacks.

*John W. D. Megaw*

GIRARD, G. La streptomycine dans la peste pulmonaire expérimentale du cobaye. [**Streptomycin in Experimental Pneumonic Plague of Guineapigs.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 7/8, 339–42.

Seven control guineapigs inoculated intratracheally with virulent cultures of plague bacilli died after 38 to 84 hours.

Every one of 12 guineapigs survived after a similar inoculation followed by a course of injections of streptomycin, starting in most cases 30 hours after inoculation and continuing for four or five days during which a total dosage of 125 to 200 mgm. was given.

The action of the drug was found to be bacteriolytic *in vivo* and *in vitro*, as well as bacteriostatic ; to this double effect the author attributes the rapid cure and also the ascertained absence of immunity among the guineapigs which had been cured. *John W. D. Megaw*

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## CHOLERA

COLLIER, H. O. J., HALL, Iris F. & WATERHOUSE, Pamela D. **Studies in the Chemotherapy of Cholera. I. The Laboratory Evaluation of Remedies for Cholera.** *Ann. Trop. Med. & Parasit.* 1949, Oct., v. 43, No. 2, 155–63. [11 refs.]

Accepting that laboratory tests may not give direct indications of the clinical usefulness of a drug for the chemotherapy of cholera, the authors have suggested the adoption of certain criteria for the properties a compound should possess in order to be effective by virtue of its bacteriostatic activity. The factors taken are :—

(*a*) vibriostatic activity *in vitro*, (*b*) solubility, (*c*) toxicity, (*d*) retention in the mobile contents of the alimentary canal, (*e*) activity in the alimentary canal, and (*f*) stability in the alimentary canal.

*Vibriostatic activity in vitro.*—The test applied is the action of different concentrations of the drug on measured inocula of *V. cholerae* in peptone-water at *p*H 7·0 to 7·8. The inocula used are $10^6$ and $10^3$ vibrios per ml. Incubation

is at 37°C. and the results are read at intervals from 16 hours to 3 days. It is considered that the closer the concentrations of a drug are which are effective against these two different levels of inoculum, the more likely it is that it will be effective against large numbers of vibrios.

A close relationship between the inhibitory concentrations effective at 24 hours and at 4 days is important; the authors have designated this the "holding power".

*Solubility.*—An appreciable margin is desirable between the concentration obtainable in solution in the liquid contents in the bowel and the minimal concentration inhibiting large numbers of vibrios. Solubility is measured in water at 37°C. and vibriostatic activity as above against $10^6$ vibrios per ml. in peptone water.

*Toxicity.*—In addition to estimation of the intraperitoneal LD50 dose for mice a test of oral toxicity is employed. The maximal concentration of the drug in a dry powdered diet, which 80 per cent. of mice will survive for at least 3 weeks, is determined.

*Retention in the mobile contents of the alimentary canal.*—The degree of retention is estimated by comparing the percentage of the drug in the dried faeces of mice with that in the dry diet given.

*Activity in the alimentary canal.*—An indirect test is used; the pooled faeces of a group of mice fed on the standard dry diet, to which a known percentage of the drug has been added, are suspended in peptone water at a dilution of 1 in 40. The *p*H is brought to 7·0 and a further dilution of 1 in 2 is made. After autoclaving, a vibrio inoculum of $10^3$ per ml. is added and incubation is carried out at 37°C. The degree of inhibition of growth and its persistence is recorded. The highest dilution of the faeces inhibiting growth after a given period of incubation is called the "vibriostatic titre".

*Stability in the alimentary canal.*—This is assessed from (*a*) the results of the tests with mouse faecal suspensions, (*b*) the data for *in vitro* activity, and (*c*) the concentrations found in the faeces. The findings may show whether the compound has been inactivated after ingestion. From the various tests are calculated (i) the size-inoculum effect, (ii) the "holding power", (iii) the margin between solubility and vibriostatic activity, and (iv) the retention in the mobile contents of the alimentary canal.

These tests were applied to sulphaguanidine and "formo-cibazol" [see this *Bulletin*, 1948, v. 45, 516, 601]. Saturated solutions of both gave poor results in the *in vitro* test for vibriostatic activity against an inoculum of $10^6$ vibrios per ml. This is considered likely to limit the value of these compounds in cholera. The retention of both in the alimentary canal was good, the concentration of sulphaguanidine in the direct faeces being 1·5 times, and that of "formo-cibazol" twice, the dietary percentage.

The mouse faecal-suspension test with sulphaguanidine showed that when the drug was administered to mice as 4 per cent. of their diet considerable bacteriostatic activity was conferred on their faeces. A greater bacteriostatic activity was obtained with "formo-cibazol" at a concentration of 1 per cent. in the dry diet than with sulphaguanidine at 4 per cent. These results had been obtained against inocula of $10^3$ vibrios per ml. but when the heavier inoculum of $10^6$ per ml. was used there was only slight inhibition.

The assessment of stability in the alimentary canal suggested that neither drug had been changed in passage through the intestine.

On the criteria adopted it is considered that "formo-cibazol" might be expected to be somewhat more effective in cholera than sulphaguanidine, but its value may be limited by its inability to deal with large numbers of organisms.

*J. Taylor*

## AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

SHEEDY, J. A. **Intestinal Parasites in Patients with Viral Hepatitis.** *Bull. U.S. Army Med. Dept.* 1949, Dec., v. 9, No. 12, 998–1004. [12 refs.]

"Ninety-six patients having proved viral hepatitis were surveyed for intestinal parasites. All were serving in Europe. It was thought that if viral disease represented poor sanitation, perhaps parasitic contaminants might also be present. This was not found to be the case. Parasites were found in 52·08 per cent. of the series. Amebiasis was found in 6·05 per cent. The incidence of other parasites showed no marked difference from that reported by other investigators for the United States as a whole."

WESTPHAL, A. Amöbenruhr auf Santo Domingo. [**Amoebic Dysentery in St. Domingo.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Aug., v. 1, No. 2, 225–30, 1 fig. (map).

Stool-examinations (126) carried out by the author in 1939–40 revealed the presence of *Entamoeba histolytica* (active and cysts) in about 9 per cent. of the inhabitants of St. Domingo. Subsequently RAVELO-BARRÉ and THOMEN [this *Bulletin*, 1944, v. 41, 289] examined 500 moré stools, 14 per cent. of which contained amoebae, which these observers attributed to the "small race" [*i.e. E. hartmanni*]. However, the present author found only *minuta* forms, *i.e.* lumen-forms of the large race, both in his own material and in specimens sent to him by RAVELO.

According to the statistics of the Republic of Santo Domingo published in 1939, in 1937 there were 836 cases of amoebic dysentery. Since the infection rate based on the examination of 626 stools is about 13 per cent., the total number of *E. histolytica* carriers in the Republic is about 192,000 in a population of about 1½ million, and the ratio of amoebic carriers to cases of dysentery is approximately 1 : 300.

The author has previously attributed the occurrence of amoebic dysentery to intestinal lesions produced by bacteria [this *Bulletin*, 1949, v. 46, 546]. Observations carried out in St. Domingo seem to support this view, for the incidence of this disease increases during the dry season, when the population uses water highly contaminated with thermophilic microorganisms, and there is a rise in the incidence of typhoid fever. *C. A. Hoare*

FERNANDO, C. F. **The Rôle of the Amoeba in Disease.** *J. Ceylon Branch Brit. Med. Ass.* 1949, Apr., v. 44, No. 2, 1–8.

This is the presidential address for 1948 delivered to the Ceylon branch of the British Medical Association in January of that year. It consists of a general review of amoebic disease as encountered by the author in Ceylon, and contains little that is original. Attention is directed to an enteric-like form of acute intestinal amoebiasis, in which the patient is febrile and passes stools containing neither blood nor mucus. In reference to treatment it is stated that stovarsol is a dangerous drug, and that there have been many cases of encephalitis after its use even for limited periods; carbarsone and leucarsone, on the other hand, are safe in recognized dosage. *A. R. D. Adams*

MENK, W. & MOHR, W. Zur Frage des Vorkommens der *Entamoeba histolytica* im Duodenalsaft des Menschen. [**On the Occurrence of *E. histolytica* in Duodenal Juice.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Aug., v. 1, No. 2, 231–3.

Though occasionally *Entamoeba histolytica* has been found in the lower region of the small bowel, it normally inhibits the large bowel, and it is

generally held that metastatic infections are introduced into the liver by amoebae which escape from the ulcers into the blood stream. The possibility of hepatitis and liver abscess arising by extension of an amoebic infection of the duodenum has not been seriously considered, in spite of the reported occurrence of *E. histolytica* in the duodenal contents, by KOFOID [this *Bulletin*, 1926, v. 23, 722], as well as by D'AMATO [this *Bulletin*, 1928, v. 25, 219] who is not mentioned by the authors. However, recent confirmation of the earlier findings, by WESELMANN and by OTT [this *Bulletin*, 1943, v. 40, 606, 781] has induced the present authors to re-investigate this question.

They have examined the duodenal juice and bile (with and without centrifugation, in fresh and stained preparations, and by culture), for the presence of *E. histolytica* in 35 patients of the Hamburg Tropical Institute. These comprised 6 with acute amoebic dysentery, five of whom had a painful enlargement of the liver suggestive of hepatitis, and 29 cases of chronic amoebiasis, of which 14 showed no signs of liver enlargement, while in 15 it was enlarged. In none of these cases was any form of *E. histolytica* found. In the cases with liver enlargement, microscopic examination revealed leucocytes and epithelial cells, which are easily confused with amoebae but can be readily differentiated in haematoxylin-stained preparations, upon which the authors relied for the detection of *E. histolytica*. In about half of these cases bacteria (*Bact. coli* enterococci, staphylococci) were also present. It is, therefore, probable that in many cases of amoebiasis enlargement of the liver might be due to cholangitis of bacterial origin, especially when the symptoms do not subside after emetine treatment. *C. A. Hoare*

DE SILVA, P. C. C. **Amoebiasis in Infancy.** *Brit. Med. J.* 1949, Nov. 26, 1208–10. [13 refs.]

Amoebiasis is usually considered to be rare during infancy in Europeans, though less so in tropical peoples. The author finds it to be as prevalent in infants in Ceylon as in adults there. In Colombo, and in an adjoining suburb with no piped water supply, of 291 infants under 2 years of age suffering from infantile diarrhoea 40 (15·9 per cent.) were found to have an active intestinal infection with *Entamoeba histolytica*; of 1,212 children, nearly half of them under 10 years of age, 116 (9·5 per cent.) were found to harbour this parasite. A distinction is made between *E. histolytica* and *E. histolytica minuta*; 11 of the 40 cases of infantile diarrhoea harboured the former, but 29 of them had the latter parasite. Though both forms proved equally pathogenic, *E. histolytica minuta* infections were thought to be the more amenable of the two to emetine and carbarsone treatment; it is suggested that the *minuta* forms are "an exhausted or attenuated variant of the larger type and therefore more amenable to therapy." *A. R. D. Adams*

LAMBILLON, J. & BEHEYT, P. L'amibiase hépatique au Congo Belge. [**Amoebic Hepatitis in the Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Sept. 30, v. 29, No. 3, 307–27.

The purpose of this paper is to direct the attention of young practitioners to the frequency of amoebic liver involvement in the Belgian Congo, both in the African and in the European population. The difficulties in diagnosis are considerable, but increasing personal experience leads to the recognition of increasing numbers of cases. The symptoms and signs encountered in over one hundred cases of amoebic involvement of the liver personally dealt with by the authors are mentioned, and these serve to emphasize the variability of the manifestations seen in different cases. Males were very much more commonly affected than females, although intestinal amoebiasis is common in both. In contradistinction to the text-book teaching, large abscesses at times were

seen in African patients who had neither hectic fever nor heavy sweats, and who were not prostrated ; parasites were rarely found in the stools of those with amoebic liver abscesses. Exploratory puncture with a very large needle is advocated as a routine diagnostic measure, and is considered to be devoid of risk. The material obtained from the abscesses has been thick and yellow or chocolate, or more liquid and red in colour, according to the stage of the lesion. Pain over the eighth or ninth right intercostal spaces in the anterior axillary line (" Manson-Bahr's point ") is characteristic of an abscess of the right lobe and upper portion of the liver, and has proved of great value in early diagnosis.

In medicinal treatment emetine is used, but great stress is laid on its toxicity ; small doses only should be given and the treatment should be repeated at intervals in view of the frequency of relapse. The surgical treatment recommended is free and prolonged drainage.

In discussion RODHAIN expressed the opinion that the small doses of emetine advocated by the authors account for the frequency of relapse in their cases, and he emphasized the importance of sterilizing the primary gut infection by suitable treatment [a matter to which the authors do not refer]. In reply LAMBILLON stated that though in Belgium big doses of emetine are given, in Africa smaller doses can cause grave toxic effects ; he has, however, seen relapse in cases in Africa treated with large doses of the drug and it is for this reason he advocates repetitive treatment. *A. R. D. Adams*

OUARY, G. A propos des hépatites amibiennes : les abcès du foie. [**Amoebic Hepatitis and Liver Abscess.**] *Méd. Trop.* Marseilles. 1949, May–June, v. 9, No. 3, 450–57.

The author discusses the difficulty in differentiating between amoebic hepatitis and amoebic abscess of the liver. In all cases in which hepatitis correctly treated by emetine fails to regress, abscess formation should be suspected. Persistence of pyrexia, although the pain has ceased and the liver has returned more or less to normal volume is an obvious sign ; so too is persistence of tenderness on pressure at a fixed point after the temperature has returned to normal, even if the hepatic enlargement has disappeared. Sometimes pyrexia and pain have ceased, but the liver, though smaller, has not become normal and abscess is to be suspected if the general condition is not satisfactory. The patient must be kept under observation : leucocytosis and persistence of radiological signs of liver involvement must be tested from time to time; as they may be increasing in spite of apparent clinical improvement. Clinical details of five cases are given to illustrate these points. In two the clinical signs left no doubt of the correct diagnosis ; in the third the diagnosis was not clear until three months from the start of symptoms, when the patient passed dysenteric stools containing amoebae, a course of emetine produced no improvement and a large abscess was subsequently drained. In a fourth case the onset was sudden and the physical signs ambiguous ; an abscess was located after two aspirations, the second time with injection of lipiodol to define the small cavity ; amoebae were found in the stools four days after operation. In the fifth case an abscess had formed in spite of treatment of relapsing hepatitis by three courses of emetine. The aspirating needle should be used in all doubtful cases, with the patient in the operating theatre, in case open drainage is indicated. *W. L. Harnett*

ISAZA MEJIA, G. Vaginitis amibiana. [**Amoebic Vaginitis.**] *Rev. Méd. Yucatán.* 1949, Oct. 31, v. 25, No. 7, 128–30.

The author records three cases of vaginal amoebiasis seen in Mexico. In all cases vegetative forms or cysts, or both, of *E. histolytica* were found in the vagina or its secretion, either by fresh smears or in biopsy sections.

All the patients were treated with emetine and their lesions cleared up within 10 days.

The predominant clinical features common to the cases were an abundant sero-sanguineous discharge and ulcers closely resembling carcinoma.

Since the author has seen three such cases in eight months, he suggests that the condition may be commoner locally than has been believed [see also this *Bulletin*, 1949, v. 46, 742]. *H. J. O'D. Burke-Gaffney*

ARMSTRONG, T. G. **The Treatment of Amoebiasis.** *South African Med. J.* 1949, Oct. 22, v. 23, No. 43, 875–81.

There are four clinical types of sufferer from bowel amoebiasis :—

(1) The symptomless cyst passer.
(2) The cyst passer with symptoms.
(3) The true case of amoebic dysentery.
(4) The sufferer from post-dysenteric infective colitis.

(1) Symptomless bowel infections with *Entamoeba histolytica* are common in various communities throughout the world ; in the author's view the presence of cysts in the stools shows complete tolerance or equilibrium between the host and his parasite, but the presence of free amoebae is indicative of a breakdown of saprophytic equilibrium and its replacement by parasitic virulence.

(2) The patient with symptoms who is passing cysts presents difficulties in diagnosis, and the validity of attributing the symptoms to the infection " in the long run can only be assessed by therapeutic trial."

(3) Those with true amoebic dysentery give a definite history of dysentery, pass amoebae in the stools, and have visible lesions on sigmoidoscopy.

(4) In cases of post-dysenteric colitis, the protozoal infection has vanished, but symptoms persist either as a result of secondary infection of the bowel or because of a simple functional disorder of the bowel without structural disease.

The author states that the host-parasite relationship varies with race and geographical locality ; in Durban, *E. histolytica* infection in Europeans and Indians is a benign condition, in Africans it is " malignant." It is not therefore surprising that the therapeutic response to various drugs varies from race to race and place to place. In reference to diagnosis the statement is made that " the ease of distinguishing the trophozoite phase of *E. histolytica* is only paralleled by the difficulty of distinguishing the cystic form " and the author then enlarges on this theme by observing that the microscopical identification of cysts by pathologists and technicians " is made on morphology described by others and on tradition," and so " is correspondingly fallible."

Some observations then follow on the various drugs used in treatment and it is claimed that 4,000 patients have been treated with 10 to 15 grains of emetine during the last 2½ years with only two instances of serious cardiac damage and then only " following gross but unavoidable overdosage."

[This paper is written very dogmatically, and while the author states that the subject is controversial he is quite correct in saying that " there will be many who will disagree with the views expressed." Although he claims that " factual observations can be easily identified and distinguished from personal conclusions and opinion " this is by no means the case. There are a number of unsupported assertions, for example on the identification of the parasites, which are at variance with fact and without indication that they are merely opinions held by the author.] *A. R. D. Adams*

NODENOT & PORTE. Nouvelles observations sur le traitement de la dysenterie amibienne par la conessine. [**Further Observations on the Treatment of Amoebic Dysentery with Conessine.**] *Rev. du Paludisme et Méd. Trop.* 1949, Oct. 15, v. 7, No. 65, 211–19.

MERLE, F. La conessine dans le traitement de la dysenterie amibienne de l'enfant. [**Conessine in the Treatment of Amoebic Dysentery in Children.**] *Ibid.* 220–22.

An editorial by PLOYÉ states that since the publication by LAVIER, CROSNIER & MERLE [this *Bulletin*, 1949, v. 46, 469] of the satisfactory results obtained with conessine in the treatment of amoebiasis many French workers have reported most favourably on its use in this condition. These French workers consider conessine a weapon of great power, if properly handled, and one to replace emetine, a drug which, they think, is often ineffective and always toxic. The main criticisms so far levelled against conessine have been its toxicity to the central nervous system and the uncertainty of its action in acute amoebic hepatitis. The major portion of this number of the journal is devoted to further reports on the successful treatment of various manifestations of amoebiasis with conessine, and assurances that the toxic side-effects can readily be controlled by sedatives.

(1) PORTE records the treatment with conessine of 2 "emetine resistant" cases of amoebiasis at Saigon; both patients greatly benefited from the treatment and, it is implied, were cured of their amoebiasis [though positive evidence of this is not forthcoming]. He treated 3 cases of presuppurative amoebic hepatitis with conessine with "spectacular" benefit; and a child of 3 years with acute relapsing amoebic dysentery, who improved only temporarily on emetine therapy, was restored to normal by a course of conessine.

(2) MERLE, after commenting on the inadvisability of prescribing emetine for children, records the successful results of conessine treatment of amoebiasis in 11 children ranging in age from 2 years to 9 years, the drug being given in tablets for 5 to 7 days [average daily dose for a child of 5 to 10 years=5 tablets of 0·02 gm. each].

[While these reports record a dramatic clinical response, and the amelioration of a variety of symptoms, to conessine treatment, no satisfactory evidence is adduced of parasitic cure following it in any case.] *A. R. D. Adams*

CANET, J. A propos des nouveaux traitements contre l'amibiase. [**New Therapeutic Measures against Amoebiasis.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 9/10, 479–85.

A record of the results of the treatment of 35 patients suffering from acute amoebiasis in Cochin China with conessine hydrochloride, conessine hydrobromide, or the total extracts of *Holarrhena floribunda*. The last of the three preparations proved effective against *Trichomonas* infestations, but had no action on malaria infections, or on *Ascaris*, hookworm, *Strongyloides*, *Giardia* or whipworm infestations. Many of the indigenous agricultural workers treated with conessine showed severe neuro-psychopathic signs of toxicity due to the drug in spite of sedative therapy; some of these were so alarming as to necessitate the immediate suspension of treatment. These signs were noticeably less frequent (20 per cent. of cases affected) and less severe when the total extracts of *Holarrhena* were employed than when the salts of conessine were used (40 per cent. of cases affected), presumably because the total extract contained a smaller dose of conessine. For this reason, and as it proved as therapeutically efficacious, the total extract is preferable to the salts for the treatment of amoebiasis, but the big doses of any of these compounds previously

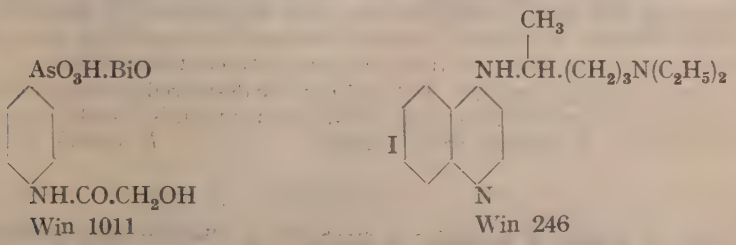
advocated should be reduced. Toxic manifestations after conessine can be divided into two clearly demarcated groups—early and late. The early occur in the first two days of treatment, and are apparently due to the action of the drug on the parasites and resemble the early reactions associated with the Hetrazan treatment of filariasis : the late signs are more serious ; they appear after the third day of treatment and involve primarily the nervous system. The possible gravity and the personal and social repercussions of severe late toxicity with psychosis require emphasis ; they should not be underestimated, as has too often been the tendency recently. In recapitulation the author states that emetine is *not* an outmoded therapeutic remedy, but still holds pride of place in the treatment of severe amoebic dysentery ; the association of the *Holarrhena* alkaloids with it offers definite advantages, though these latter do not invariably include the eradication of the amoebic infection. A thorough physical examination and investigation of the history and background of the patient should be undertaken before conessine is prescribed in selected cases ; every effort should be made to minimize the risk of development of nervous and psychological manifestations, in those patients treated with conessine, by appropriate palliative treatment.

In the discussion which followed this paper, MONTEL re-emphasized the gravity of the toxic manifestations which may attend the use of conessine and quoted two cases of grave psychosis following it. PLOYÉ considered conessine a most valuable drug in amoebiasis and thought the risk of toxicity to be exaggerated. RIOU considered smaller dosages of the compounds desirable, and thought that it was the total dosage, rather than a high daily dosage, which was important in treatment. He advocated various forms of adjuvant treatment, notably an antihistaminic, intravenous calcium, and large doses of vitamins C and $D_2$, to lessen the toxicity and increase the amoebicidal power of the *Holarrhena* extract.

[This paper and discussion seem to the reviewer to give a more objective and less partisan appraisal of the value of conessine and its dangers in the treatment of amoebiasis than do the majority of the numerous papers on this subject emanating from French sources recently.] *A. R. D. Adams*

DENNIS, E. W., BERBERIAN, D. A. & HANSEN, Sophie S. **Amoebicidal Activity of Bismuthoxy p-N-Glycolyl-arsanilate and 7-Iodo-4-(1-Methyl-4-Diethyl-aminobutylamino) Quinoline Diphosphate.** *Amer. J. Trop. Med.* 1949, Sept., v. 29, No. 5, 683–9, 1 fig. [13 refs.]

Tests have been carried out *in vitro* and *in vivo* with the two substances named in the title, which have the following constitutions.




In the *in vitro* tests a strain of *E. histolytica* was used, accompanied by a mixed bacterial flora. The large volume of 0·5 cc. of culture medium was used to seed the tubes containing 4·5 cc. of liquid medium. Golden hamsters naturally infected with amoebae were used in the *in vivo* tests as it had been found that the infecting amoebae, which were present in all hamsters over a certain

weight, were susceptible to adequate doses of known amoebicides including carbarsone, chiniofon or diiodo-oxyquinoline. The author found this parasite to be indistinguishable from *E. muris* of the rat and mouse. [Larsh and Chaffee, this *Bulletin*, 1949, v. 46, 469, found that carbarsone was unable to eradicate *E. muris* in naturally infected mice, and Neal, *ibid.*, 470, reported the same results for emetine and carbarsone.] The drugs were given orally twice daily for 5 days in 10 per cent. hydrolysed gelatin. On the day after the last treatment the animals were killed and fresh preparations of their intestinal contents were examined microscopically for the presence of amoebae. It was found that the substance Win 1011 whose action on amoebae was tested by Hauer [this *Bulletin*, 1943, v. 40, 913] had about one-half the activity of emetime *in vitro*, while Win 246 was much less active. Both were effective in freeing hamsters of their infection; the latter, however, proved somewhat toxic. The substance Win 1011 was without toxic effects and preliminary therapeutic trials in human amoebiasis were promising. *J. D. Fulton*

Newton, W. L. & Jones, Myrna F. **Effectiveness of Silver Ions against Cysts of *Endamoeba histolytica*.** *J. Amer. Water Works Ass.* 1949, Nov., v. 41, No. 11, 1027–34.

A review of the available literature on the subject indicates that 0·1 part per million of silver ions is sufficient to ensure the bacterial safety of a water after a period of exposure of a few hours. These results prompted the author to observe the efficacy of silver ions for the destruction of cysts of *Endamoeba histolytica*. Cysts were exposed to various concentrations of silver ions for varying periods of time at temperatures between 24°C. and 26°C. The silver ions were provided either by silver foil electrodes in tap water, with a current of 6–7 milliamps at 6·2 volts for one hour; or by a solution of silver nitrate in distilled water. The criterion of survival of the cysts was the appearance of growth in modified Boeck-Drbohlav's culture medium.

Silver ions produced electrolytically resulted in a 99 per cent. reduction of cysts after one hour's exposure. On account of alteration of *p*H and the presence of other ions in tap water it was difficult to estimate the amount of silver required to destroy the cysts, but dithizone tests of silver in the supernatant water indicated a concentration of the order of 20–30 ppm.

The results when silver nitrate was used may be summarized as follows: with approximately 0·63 ppm. of silver a very long exposure was required, complete destruction occurring in two experiments after 22 hours; with approximately 6·3 ppm. destruction was over 99 per cent. in three hours; with approximately 31·7 ppm. complete destruction occurred in two hours. The latter results are similar to those obtained with electrolytic silver.

It is concluded that cysts of *E. histolytica* can be destroyed by silver ions, but the concentrations of silver required are far greater than is usually suggested for the treatment of drinking water supplies. *E. Windle Taylor*

Unsworth, K. **Failure of Mepacrine Hydrochloride to eliminate Oocysts from the Faeces of Rabbits chronically infected with *E. stiedae*.** [Correspondence.] *Nature*. 1949, Dec. 3, 958–9.

See also p. 252, Mazzotti, **Parásitos intestinales en habitantes de la ciudad de México.**

LUBINSKY, G. **A Galvanotactic Procedure for the Concentration of *Balantidium coli* in Feces.** *J. Lab. & Clin. Med.* 1949, Aug., v. 34, No. 8, 1154–61, 4 figs.

The author has applied the phenomenon of galvanotaxis for the concentration of *Balantidium coli* in faeces, for which a special apparatus was devised. In this a rectifier with a potentiometer, producing a direct current of 132 volts, is used as a source of current. Copper electrodes are immersed in Petri dishes containing saturated copper sulphate solution, and these are connected by means of agar bridges with a pair of dishes containing Ringer's solution, which in their turn are connected by agar bridges with the part of the apparatus that serves for the concentration of the ciliates.

This part originally consisted of a glass slide with three chambers arranged in a row and connected by channels filled with 2·5 per cent. agar in Ringer's solution. A faecal suspension in Ringer's solution was placed in the central chamber and covered with a coverslip, while the side chambers were filled with Ringer's solution into which the agar bridges were immersed. The resistance between the electrodes was 30,000–35,000 ohms. The concentration apparatus finally adopted consists of the following parts: (1) a test-tube 70 mm. long and 22 mm. in diameter, which is filled with the faecal suspension in Ringer's solution and immersed in a water bath at 39°C., corresponding to the rectal temperature of the pig; (2) a narrower tube filled with Ringer's solution, which is suspended in the test-tube by a glass hook and is closed by a porcelain filter at the lower end; to this end is attached a short piece of rubber tubing which almost reaches the bottom of the outer tube. The anodic agar bridge is dipped for a short distance into the faecal suspension, while the cathodic one is inserted deep into the inner tube. The current strength was 0·3 to 6·0 milliamperes, the resistance being 35,000–40,000 ohms.

The ciliates accumulate under the porcelain filter, inside the lumen of the rubber tube, which thus forms a kind of a " trap " for them. The greatest concentration is obtained after 10 minutes, when the inner tube is removed and the contents of the " trap " can be examined microscopically. For counting *B. coli*, a drop of saturated Weigert's iodine was added, and the nuclei were stained with a mixture of equal parts of a saturated aqueous solution of methyl green and 40 per cent. formaldehyde.

Using this method, the author examined 150 faecal samples from pigs. In 100 cases the percentage of positive results obtained without concentration was 56, increasing to 92 after concentration, while in 50 cases the corresponding figures were 34 and 52. It is suggested that this galvanotactic method might also be employed for concentrating *B. coli* and other protozoa in human stools. The apparatus described in this paper is shown in three figures.

*C. A. Hoare*

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## YAWS

HACKETT, C. J. **Gaps in the Knowledge of Yaws.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Nov., v. 43, No. 3, 311–16. [26 refs.]

The author deals with the aspects of yaws still requiring investigation, under the following headings.

*Aetiology.—Treponema pertenue* was described by CASTELLANI in Ceylon in 1905, SCHAUDINN having discovered the *Treponema pallidum* of syphilis previously in the same year. Their morphological similarity raised the problem

of their identity and this was made more difficult by the discovery of an indistinguishable treponema in " bejel ", the non-venereal syphilis of Bedouins, by HUDSON [this *Bulletin*, 1937, v. 34, 965], and of *Treponema carateum* as the cause of pinta by SAENZ in 1938. The author thinks that, owing to the great differences of opinion among various authorities, a precise decision on the question of identity can only be made by study of the antigenic properties of the different organisms by techniques in general use in bacteriology, and before this is possible it is necessary to obtain adequate suspensions of the treponemata. The use of the developing chick embryo may provide this. There is need also for a more suitable animal for experimental infections than those used in the past.

*Epidemiology.*—It is generally acknowledged that yaws is acquired by an initial skin infection, usually in early life, and this could easily occur by direct contamination of skin abrasions by the highly infective discharges from florid secondary lesions. While *Trep. pallidum*, as tested by mobility, can survive up to two months out of the body if kept moist, YASUYAMA in 1928 found that *Trep. pertenue*, as tested by inoculation, survives outside the body at 28°C. for only 30 minutes in saline and two hours in human serum. This calls for accurate knowledge which should be closely related to the high incidence of yaws in wet countries and seasons, and the extent to which inanimate objects may transmit the disease.

In Jamaica, attention has been drawn to the possibility of transmission by chloropid flies (*Hippelates pallipes*). Many primary lesions are found on the lower part of the leg, an area liable to considerable minor trauma in an ill-clad population. It is probable that congenital transmission does not occur, but adequate observations have not been recorded.

*Geographical Distribution.*—Differences of incidence in endemic areas need correlation with climatic factors and the standard of life and hygiene in the population concerned.

*Pathology.*—No autopsy has yet apparently been recorded on a case of secondary yaws, and the distribution of the treponemata in the body, undoubtedly widespread, is quite unknown, nor is it known where the organisms remain during the quiescent periods between relapses. More studies are needed of all lesions, especially the pathology of palmar, plantar, bone and tertiary skin lesions.

*Clinical.*—Lesions of the palms and soles need further study, and more information is required on the character and evolution of the initial lesions. Carefully conducted inoculation of human volunteers would add greatly to our knowledge. The finding of lesions of the buccal mucous membrane in 5 per cent. of cases of secondary yaws by the author in 1946 in Uganda is noted [this *Bulletin*, 1947, v. 44, 527], and a careful search is needed in yaws areas where syphilis does not occur [?] for late heart and central nervous lesions. [In the present state of our knowledge it would appear very difficult to exclude the odd case of lues.]

*Diagnosis.*—No satisfactory records have yet appeared of epiphyseal osteochondritis in infants, congenital infection, visceral gummata and heart, nervous system and eye lesions in yaws. The finding of treponemata, and positive non-specific serological reactions, are of no value in differentiating yaws from syphilis, and discovery of a specific serological test is needed.

*Treatment.*—It is essential that the composition of all preparations and the metallic content of bismuth salts used should be included in all reports so that accurate comparisons may be made. Further study is needed to establish the minimum amount of a drug or combination of drugs, (*a*) to reduce the relapse rate to a level low enough for ordinary dispensary treatment to keep the disease under control, and (*b*) to reverse positive serological reactions.

The amount of suffering and the economic disability arising from yaws is not generally realised. It is very important to determine whether eradication of yaws will cause an increase in the incidence of syphilis.

In his summary the author remarks that a complete description of yaws has not yet been written and there are many gaps in our knowledge. To fill them requires work by bacteriologists, epidemiologists, pathologists, clinicians and hygienists. Some of this work must be done in laboratories, but much of it must be carried out in the field. *C. F. Shelton*

Siguier, F., Lamy & Trélat, J. Ostéite pianique tertiaire chez un Africain transplanté. [**Osteitis from Tertiary Yaws in an African in France.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1949, Nos. 23/24, 972–5, 2 figs.

This is a report with clinical and radiographic illustrations of a healthy African student aged 15½ years, who had contracted yaws in the Ivory Coast when he was five years of age.

Soon after his arrival in Paris he started to have pains and swelling in his legs. His tibiae became thickened and tender, and when seen about a year later, the anterior tibial profile was convex and in the radiographs tibial bowing, and thickening of the anterior tibial cortex, were seen. The fibulae were also thickened. His serum gave a positive Wassermann reaction. No other abnormality was observed.

The author discusses the possible causes of the condition and concludes that the patient's origin, history and age indicate that the lesions were due to yaws, and since bone lesions in yaws are typically tertiary, these lesions are also tertiary. [The appearance of the radiographs suggests that the lesions might well have been secondary ones which had subsided when the patient was examined.] *C. J. Hackett*

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## LEPROSY

Floch, H. A propos de l'endémie lépreuse en Guyane française. Notes sur la lèpre dans quelques pays de l'Hémisphère Occidental. [**Endemic Leprosy in French Guiana. Notes on Leprosy in some Countries in the Western Hemisphere.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 186.* 1949, Mar., 9 pp.

Campos R. de C., J. Lepromina "Ex-cadavere". [**Lepromin prepared from Autopsy Material.**] *Rev. Brasileira Leprologia.* S. Paulo. 1949, June, v. 17, No. 2, 91–6. [16 refs.]

The English summary appended to the paper is as follows :—

"A bacillary lepromin, at a concentration of 2°/$_{oo}$ made with Hansen bacilli taken from spleen and liver of a body of a lepromatous patient has been prepared.

"This lepromin has been tested in lepromatous, tuberculoid and indifferentiated leprosy patients. Early and late results of this test are coincident with the reactions produced by bacillary lepromin made with skin nodules according to the classical technique.

"This new source of Hansen bacilli enables us to prepare bigger amounts of lepromin in accord of the requirements of a wide nation anti-leprosy campaign."

HEINEMANN, H. Akute Lepra-Reaktion. (Bericht eines Krankheitsfalles mit Bemerkungen zum Auftreten von Lepra in Europa.) [**Acute Lepra Reaction. Report of a Case, with Remarks on Leprosy in Europe.**] *Acta Tropica.* Basle. 1949, v. 6, No. 3, 268–9.

The patient, whose age is not mentioned, was seen by the author in Switzerland. He had suffered with pulmonary tuberculosis with haemoptysis on two occasions within 20 years and had returned to Europe after a stay of 14 years in the tropics [place not specified] and presented reddish blotches on the right cheek and breast ; these were proved by biopsy to be leprous and he had been treated since 1947 with chaulmoogra oil.

One hot summer's day in 1948 he developed high fever, 39·6°C. and a papular efflorescence on face, cheek, back and arms and a localized bronchitis on the left side. Hansen's bacilli were seen in secretion of the cheek leproma (but none in the nasal mucus in spite of repeated tests), and both ulnar nerves were thickened. Moist sounds were audible in the left lung and acid-fast bacilli were present in the sputum, proved by animal inoculation to be *Myco. tuberculosis*. The patient was treated with thiocalcium and antistin " Ciba ". Eight days later, after a time of improvement, the fever returned and fresh infiltrations appeared and the moist sounds in the lungs were more extensive, involving the whole of the left lung and the upper two-thirds of the right. He was treated with penicillin, coramine, cardiazol and oil of camphor [doses not mentioned]. The Mitsuda reaction was negative. The question is whether the bronchiolitis was due to an extension of the tuberculosis, to oedema from the weak heart action, or was a symptom of the leprous reaction. This is left unanswered. The author puts the case on record because, now that men have returned who have served abroad, and in view of the possibly long incubation of leprosy, cases of this disease are liable to be overlooked and valuable time lost in starting treatment.

*H. Harold Scott*

SOTO, M. C. A reação leprótica do ponto de vista ocular. [**The Leprous Reaction from the Ophthalmological Standpoint.**] *Rev. Brasileira Leprologia.* S. Paulo. 1949, June, v. 17, No. 2, 75–80.

The leprous reaction when it is accompanied by marked cutaneous manifestations and is of brief duration may exert a favourable effect on the leprosy as a whole, but if prolonged, with high fever and slight skin reaction its results seem to be deleterious. When accompanied by ocular lesions, which happens, in the author's experience, in 75 per cent. of the lepromatous forms, it is wholly regrettable, because it affects the cornea, sclera, iris and ciliary body and the final results are often disastrous. Hence, when eye symptoms occur in the course of leprous reaction they should be treated promptly and with vigour.

*H. Harold Scott*

DE FARIA, J. L. Valor da reação de Mitsuda para revelar resistência adquirida à lepra. Caso de lepra lepromatosa em transformação para a forma tuberculòide. [**Value of the Mitsuda Reaction to disclose Acquired Resistance to Leprosy.**] *Rev. Brasileira Leprologia.* S. Paulo. 1949, June, v. 17, No. 2, 97–105, 12 figs. on 6 pls. [11 refs.] English summary.

A man, 40 years of age, had shown signs of leprosy for 22 years, the first being loss of sensation over the left elbow, later extending and later still affecting the right arm. For two years he had observed lepromatous nodules on the lowest third of the legs and on the feet. When examined, he had " complete anaesthesia of the limbs ", discrete erythematous infiltration of the left supraciliary region,

the forearms showed desquamation, the bones of the fingers were absorbed, nodules were on the legs and there was plantar ulceration. As the case progressed, the type changed from the lepromatous to the tuberculoid.

The interesting point of the case is that a series of tests demonstrated that the Mitsuda reaction became positive as the transformation from the lepromatons to the tuberculoid form took place ; histologically the changes are shown by photomicrographs. Interesting also is the fact that this change in the reaction occurred while the patient still had many bacilli in the lesions and in the nasal mucus. *H. Harold Scott*

MEDINA, G. Lepra tuberculoide y lepromatosa en el mismo enfermo sobre las clasificaciones de la lepra. [**Tuberculoid and Lepromatous Lesions in the same Patient.**] *Internat. J. Leprosy.* New Orleans. 1949, Jan.–June, v. 17, Nos. 1/2, 23–6, 6 figs. on 2 pls.

The case illustrated here serves well to demonstrate the difficulty or (may we say ?) the unsatisfactoriness of the present classification of leprosy. There are two conceptions : one, that tuberculoid leprosy is an autonomous form distinct from the lepromatous ; the other that the tuberculoid is a stage towards the development of the lepromatous. The patient (now a man 44 years of age) whose case is recorded certainly seems to support this. His symptoms date from 1938 when maculae began to appear, followed by signs of tuberculoid leprosy ; in 1943 swellings appeared on the face and trunk which broke down to form ulcers, some of which cicatrized ; later fresh eruptions appeared on trunk and limbs. In June 1943 the diagnosis of tuberculoid leprosy was made. During the succeeding four years, treatment with ethyl esters of chaulmoogra, with sulphonamide drugs, diphtheria antitoxin, etc., was carried out, but leprous reactions were frequent and now, in May 1947, he is diagnosed as a case of lepromatous leprosy with typical lepromata, many in number though most of them are small, on the trunk and extremities. The patient stated that the maculae and lesions called tuberculoid disappeared after a few months to give place to these new swellings (granos) now called lepromata. Photographs show the two stages and photomicrographs the different histological appearances.
*H. Harold Scott*

BARANGER, P. De l'altération spontanée des dérivés chaulmoogriques ; formation de peroxydes. [**Spontaneous Alterations in Derivatives of Chaulmoogra ; Formation of Peroxides.**] *Internat. J. Leprosy.* New Orleans. 1949, Jan.–June, v. 17, Nos. 1/2, 49–59, 4 figs.

There is considerable divergence of opinion regarding the value of those derivatives of chaulmoogra of which definite chemical constitutions have been recognized. It has even been suggested that some impurity extracted with the oil is responsible for activity and that this may sometimes be lost, depending on the method of refinement employed. According to the author's own observations, sterilization or ageing sometimes causes a loss of potency and he has therefore investigated the possible chemical changes which may occur during preparation.

As a preliminary the action of oxygen and air on chaulmoogra oils or the alkyl esters prepared from them was studied. It appears that these esters absorb the oxygen with formation of peroxides, which is followed by further oxidative changes whereby the molecular structure is completely altered and the change is accelerated by heat, light and the presence of free acids. When the products are sterilized at 100°C., with destruction of peroxides, and kept in sealed ampoules, no further changes take place. Quantitative estimations of the

amount of peroxide present were based on the iodine liberated from sodium iodide, and this simple method was used to study the formation of peroxides in chaulmoograte from different sources. Peroxides of chaulmoogric esters form 2 to 3 per cent. emulsions in water and can then be used for intravenous injection. The constitution of these peroxides and their therapeutic activity is being studied. *J. D. Fulton*

ROTBERG, A. & BECHELLI, L. M. Proposições para a proteção social dos hansenianos, suspeitos e comunicantes. [**Proposals for the Social Welfare (Protection) of Leprosy Patients, Suspected Patients and Contacts.**] *Rev. Brasileira Leprologia.* S. Paulo. 1949, June, v. 17, No. 2, 81–9. English summary.

By " suspected patients " is here implied " relations." The authors stress the fact that the terms " leprosy " and " leper " should not be used. [There is good reason, perhaps, for the latter because the word has become vulgarized and equivalent to " pariah ", but it will be difficult to find a substitute for the former, for a spade is a spade whatever it be called.] In spite of this the authors use the word " leprosy " throughout this paper.

First, as regards the patients themselves ; it is suggested that if the case is mild or in a benign stage, he should be kept under observation but not definitely diagnosed as such and for this control he should have the right to choose a clinic other than at the place of his residence, so that he may not be known or recognized ; the time of isolation (if isolation is necessary) should be as short as possible compatible with safety for others and out-patient or clinic treatment should replace it ; when possible, home isolation is preferable to institutional. At the same time it is suggested that all hospitals should have wards for burnt-out cases.

Suspects should be very thoroughly examined in order that a diagnosis may not be prematurely made and so lower the patient socially in the public eye. As for contacts, the intervals between examinations might be longer than usual. In Mitsuda-positive cases once every two years, and even up to five years might suffice, and Mitsuda-negative or weak positive, every six-months for, say, five years. *H. Harold Scott*

HANKS, J. H. & SOULE, Mary F. **An Attempt to confirm an " in Vitro Cultivation of Rat Leprosy Organism ".** *J. Infect. Dis.* 1949, Nov.–Dec., v. 85, No. 3, 225–9.

" It has not been possible to cultivate acid-fast bacteria from rat lepromas by the method of Ashbel and Poljakoff or to confirm the production of rat leprosy by inoculation of their organisms into rats."

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## HELMINTHIASIS

KOZAR, Z. **Methods of Examination of Feces and Incidence of Parasite Worms in Children in Gdańsk as compared with other European Countries.** *Bull. Inst. Marine & Trop. Med., Med. Acad., Gdańsk, Poland.* 1949, v. 2, Nos. 1/2, 71–84, 1 diagram.

Few parasitological surveys have been carried out in Poland. It is, however, known that several intestinal helminths are prevalent. The commonest are *Enterobius vermicularis, Trichuris trichiura,* and *Ascaris lumbricoides.*

*Strongyloides stercoralis* has only been encountered sporadically but it is possible that this infection is more widespread. Ankylostomiasis has not been reported but, since it is common in several European countries, it is likely to be encountered among " repatriants ". *Taenia solium* and *saginata* " appear in Poland in rather low percentage " and *Diphyllobothrium latum* is likely to be encountered among Baltic fishermen.

The method of examination adopted by the author was the flotation method of Kofoid and Barber as modified by Fülleborn. The faeces of 1,000 children aged three to 14 years were examined. Of these 411 were found infected. *Trichuris* was found in 276, *Enterobius* in 102, *Ascaris* in 76 and *Taenia saginata* and *Diphyllobothrium* in one each. Multiple infections were found in 43.

Girls and boys were affected equally but there was a considerable difference in the age distribution of the various parasites. For example both the *Ascaris* and *Trichuris* curves started below 10 per cent. at age three and rose rapidly to above 20 per cent. by age five ; the former curve then fell equally sharply to about 7 per cent. at age seven and subsequently remained at about this figure ; whereas the latter curve continued to rise and remained between 25 and 35 until age 14, when it again showed a downward tendency.

The author discusses the distribution of helminthic infections in Europe (giving a table with references to many other authors) and also their aetiology. He observes, quite rightly, that his low finding of *Taenia* infections was because the method of stool examination that he adopted was not the best method of demonstrating this parasite. *L. E. Napier*

Boventer, K. Ueber die Verbreitung menschlicher Eingeweidewürmer in Italien. [**The Spread of Intestinal Helminthiasis in Italy.**] *Zent. f. Bakt.* I. Abt. Orig. 1947, Oct. 24, v. 152, Nos. 3/4, 292–8. [15 refs.]

After quoting records of the last 20 years or so, the author proceeds to show from his own studies that the incidence of helminthic infestation in Italy has tended to increase of late. He notes that the total referred to in this paper, as examined by him, is comparatively small, only 2,201 altogether, mostly working women, with a few men and children. The method used was direct examination of faeces, hard stools being rubbed down with saline, and when the first slide did not reveal ova a second was examined. It will be obvious, therefore, that the results will understate the actual prevalence. The total comprised two groups, geographically ; 375 in Sicily and 1,826 in Italy proper. The latter were from scattered parts of the country, the former mainly from the eastern coast district round about Catania.

Speaking generally, children showed the highest incidence and adult males the lowest ; agricultural workers and those living in small townships more than others.

Coming to more detail : Just over half the subjects were infested, 51·5 per cent.; of the Sicilians 31·8 and of the Italians proper 55·6. The highest incidence was in the clay-soil districts of the Po and the Gulf of Naples. *Ascaris* and *Trichuris* head the list, the former being found in 42·3 per cent. (Sicilians 23·8, Italians 46), the latter in 14·5 per cent. (Sicilians 1·9, Italians 17·1) and both together in 6·9 per cent. (0·4 and 8·3 respectively). Other infestations were in much less degree. *Taenia* 1·25 (4·3 and 0·4 ; the only one in which Sicilians were much more affected than in Italy itself) ; *Enterobius* was about equal and only slight, 0·25 (0·3 and 0·2) ; *Trichostrongylus* and hookworm were seen in a few cases only, 0·3 per cent. each, and only in Sicilians. *Hymenolepis nana* " plays practically no part " in Italian helminthiasis.

As regards age, the author states that " 90% of the children were infested as compared with 64% of the adults in the same district " [but this conveys little, as the number of children examined is not stated and at the outset it is said that the number of children was small]. Of the children around Bergamo 62 per cent. had *Ascaris*, 13 per cent. *Trichuris*, 13 per cent. had both, 1 per cent. had *Taenia* and 1 per cent. *Ascaris* and *Taenia*. One hundred of those infested had their blood examined for eosinophilia ; 63 per cent. had " more or less increase (over 4 per cent.), in 4% the number was under 2% and 33% had over the normal proportion " [again not very informative]. It would seem that the infestation, among those examined at least, was not very serious, for questioning of the most heavily infested brought the answer that in two-thirds they " did not know they had any worms ". *H. Harold Scott*

Mazzotti, L. Parásitos intestinales en habitantes de la ciudad de México. Consideraciones sobre 36,545 muestras de materias fecales examinadas en el Laboratorio Central de Instituto Mexicano del Seguro Social. [**Intestinal Parasitosis in the Town of Mexico.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, June, v. 10, No. 2, 183–202. [12 refs.]

During the three years 1945–47 the author has examined at the Central Laboratory 36,545 specimens of faeces, by direct examination or by Faust's method. The number positive for some helminthic parasite or other was 14,387, or 39·4 per cent. Protozoal infections are referred to later.

The worm most often found was *Ascaris lumbricoides*, in 2,841 specimens, 7·8 per cent. ; nevertheless signs of infestation are not very common clinically, because nearly half the ova seen were unfecundated, 1,179 or 41·5 per cent. of the samples ; in other words more than two-fifths of the patients were harbouring female worms only. *Hymenolepis nana* came next, occurring in 2,321 specimens, or 6·4 per cent. ; *Trichuris trichiura* was third with 1,607 or 4·4 per cent., but the infestation by this is rarely heavy and in a large proportion only a single ovum could be found in a slide prepared by Faust's method. In fact, of 939 slides examined, 766 (81·6 per cent.) showed only a single ovum ; 64 (6·8) showed two, 40 (4·2) three, 27 (2·9) four, 14 (1·5) five, 17 (1·8) six to ten and only 11 (1·2) had more than this. Confirmatory evidence of the paucity of ova was found in the fact that a second examination of some of the 81·6 per cent. with one ovum failed to reveal any at all. *Taenia solium* and *T. saginata* together accounted for 599 (1·6 per cent.) positive. No distinction was made unless their respective proglottides were found, as was possible in 104 instances ; among these 16 were *T. solium* and 88 *T. saginata*. The possibility of *Cysticercus cellulosae* infesting man is mentioned but no instance is recorded. Hookworm infection was present in 140 (0·4), no distinction being made between *Necator* and *Ancylostoma*. *Strongyloides stercoralis* was found in 58 (0·2) ; *Trichostrongylus* in three patients only. *Hymenolepis diminuta* was found in 30 ; 12 only of the last had previously been reported in Mexico.

Of the protozoal infections, *Entamoeba histolytica* varied little from year to year. In 1945, of 9,683 specimens examined 888 (9·2 per cent.) were positive ; in 1946, 1,443 out of 12,118 (11·9) and in 1947, 1,421 out of 14,744 (9·6), the total being 3,752 positive among 36,545 samples examined (10·3). *Giardia intestinalis*, the next most common, was present in successive years in 797 (8·2) ; 1,163 (9·6) and 689 (4·7), or, together, in 2,694 or 7·2 per cent. of the total. *Balantidium coli* was seen four times.

For treatment of the helminthic infestations the drugs in most common use were the oil of *Chenopodium ambrosoides*, the *leche de Higuerón* (*Ficus glabrata* and other species of *Ficus*) and pumpkin seeds (*Cucurbita pepo* and allied species). *H. Harold Scott*

WALLERSTEIN, R. S. **Longevity of *Schistosoma mansoni* : Observations based on a Case.** *Amer. J. Trop. Med.* 1949, Sept., v. 29, No. 5, 717–22, 4 figs. [14 refs.]

From the literature it appears that *Schistosoma haematobium* may continue to produce eggs in man for about 30 years, and *S. japonicum* for 20–25 years ; the information pertaining to *S. mansoni* is scanty and indefinite. The author records a case of *S. mansoni* infestation with living adult flukes 26 years after the last possible date of infestation. *A. R. D. Adams*

ERFAN, H. & DEEB, A. A. **The Radiological Features of Chronic Pulmonary Schistosomiasis.** *Brit. J. Radiol.* 1949, Nov., v. 22, No. 263, 638–42, 7 figs. [10 refs.]

The chests of 103 patients with urinary or with intestinal schistosomiasis were the subject of systematic radiological examination in Egypt ; in 49 of these there were radiological changes. The changes seen could be assigned to one of three grades :—

Grade I.—focal arterial changes.
Grade II.—widespread arterial changes with slight heart changes.
Grade III.—as Grade II, but with gross heart changes.

In almost all instances the lesions were confined to the pulmonary vascular system ; they took the form of nodulation, thickening and tortuosity of the vascular network. In old-standing cases there was enlargement of the root vessels and, later, of the right ventricle.

Radiograms showing the various types of schistosomal lung lesions before and after antimony treatment are reproduced, and the differentiation of pulmonary schistosomiasis from other lung conditions is discussed. *A. R. D. Adams*

MARILL, F. G. & FRIESS, J. Essai de traitement de la bilharziose urinaire par le 3.735 RP. [**Therapeutic Trial of 3,735 RP (Miracil, Nilodin) in Urinary Schistosomiasis.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 7/8, 365–9.

3,735 RP is the hydrochloride of 1-methyl-4-beta diethyl-amino-ethyl-amino-thio-xanthone. This was tested on six Senegalese soldiers infected with *S. haematobium*. The first, who weighed 70 kgm., was given 0·15 gm. daily for eight days and 0·3 gm. daily for five days ; the urine contained eggs 16 days after the last dose. The second, weighing 56 kgm., was given 0·6 gm. daily for ten days and then after an interval of ten days 1·2 gm. daily for three days ; the urine contained eggs on the fourth day before the end of treatment. The third, weighing 59 kgm. was given 1·2 gm. daily for three days ; treatment was interrupted on account of an unexplained rise of temperature ; the urine contained eggs on the fifth day after treatment. The fourth patient received 0·8 gm. daily for ten days ; on the last day, the urine contained eggs. The fifth received 0·8 gm. daily for ten days ; on the ninth day he vomited ; two days after treatment the urine still contained eggs. The sixth received 0·8 gm. daily for five days ; after which treatment was stopped on account of vomiting and headache. The patient was then treated with anthiomaline. The urine contained eggs on the tenth day after treatment with miracil, but not on the thirteenth day (? due to delayed action of miracil, ? due to anthiomaline). [It is suggested that the interval between the end of treatment and the final examination of the urines was not sufficiently long to allow observation of the full effect of treatment. The eggs observed in the urine may have been deposited by the worms *before* treatment commenced. Moreover, no distinction seems

to have been made between live eggs and dead eggs. BLAIR *et al.* working in S. Rhodesia have observed definite therapeutic effects from doses comparable to those given above, this *Bulletin*, 1949, v. 46, 556.] *F. Hawking*

LUTTERMOSER, G. W., HASKINS, W. T. & BRADY, F. J. **Therapeutic and Toxic Properties of Oxygen versus Sulfur Bound Trivalent Antimony in Organic Antimonials.** *J. Pharm. & Exper. Therap.* 1949, Nov., v. 97, No. 3, 276–82. [10 refs.]

"A comparison was made of the effects of ammonium antimonyl malate, amonium antimonyl thiomalate, lithium antimonyl malate, and lithium antimonyl thiomalate on normal white mice and also on *Schistosoma mansoni* infections in these animals. The four compounds contain antimony bound to carbon through oxygen or through sulfur. No marked differences in toxicity and therapeutic effects were found that could be attributed to the type of antimony linkage."

EMMEL, L. Beiträge zur Biologie und Morphologie der "Cercaria ocellata". [**Observations on Biology and Morphology of** *C. ocellata*.] *Zent. f. Bakt.* I. Abt. Orig. 1947, Oct. 24, v. 152, Nos. 3/4, 285–91, 4 figs.

The adult form of "*Cercaria ocellata*" is unknown, and the author of the present paper believes that several species of eyed cercariae found in Germany are referred to under this name. These cercariae show close morphological resemblances, but fall into different groups according to the species of molluscs parasitized by them. That this is not a chance association is proved by the fact that although two, or more, species of mollusc may be equally abundant and widely distributed in two well-separated areas, nevertheless, in one area "*C. ocellata*" may be found confined to one species and in another area confined to a different species. It was also noted that different groups of cercariae react differently to light stimuli; thus, although the majority of cercariae emerging from snails were attracted to the light side of the aquarium, groups of cercariae from one species of molluscan host persistently attached themselves by their ventral sucker to the glass, whereas cercariae from other species of snails, although attracted to the light, remained swimming actively in the rays.

Cercariae emerging from *Lymnaea auricularia*, *L. stagnalis*, *L. palustris* and *L. ovata* were allowed to penetrate the skin of fowls, ducks, mice and human volunteers. It was noted that whatever the source of the cercariae or the species of the host to which they were exposed, a high proportion of the cercariae (more than 90 per cent.) rapidly penetrated the skin. In the case of fowls and ducks no immediate or delayed reaction was observed. On the other hand, mice which had been partly immersed in water containing cercariae showed a marked swelling of the feet within half an hour of their exposure. After the swelling had subsided, which it did an hour or so later, the animal still exhibited signs of irritation in the feet and tail.

Human volunteers exposed to "*C. ocellata*" showed a wide range of skin reactions, varying from a complete negative to one in which the penetration was followed by a marked and prolonged local dermatitis. Out of seven persons tested, four showed a marked increase in the proportion of eosinophiles occurring in the peripheral blood. This eosinophilia showed no relationship to the presence or absence of a previous history of dermatitis following the penetration of the cercariae. *R. M. Gordon*

Hsu, H. F. **Studies on certain Problems of** *Clonorchis sinensis*. **X. On the Possibility of acquiring Clonorchiasis in Nanking and other Nonendemic Areas in China.** *Chinese Med. J.* Shanghai. 1949, Apr., v. 67, No. 4, 189–92. [14 refs.]

In the Cantonese restaurants of Nanking, a raw fish congee, made from *Ctenopharyngodon idellus*, is served. Although Nanking is a non-endemic area for clonorchiasis, this species of fish is the same as that used in raw fish dishes in Canton, Kwangtung Province, the only province in China to have endemic clonorchiasis. The author was concerned to find out if *C. idellus* as served in Nanking, was a possible source of infection, and obtained 26 fish from the market. These were examined by a digestion technique which is described, and *Clonorchis* cysts were found in 11, the average number of cysts being two and the highest number in one fish being eight. It is thus established that the infection may be spread outside the known endemic areas by the selling of raw fish dishes in Cantonese restaurants. *J. J. C. Buckley*

Hernández Morales, F. **The Treatment of** *Taenia saginata* **with Atabrine.** *Puerto Rico J. Pub. Health & Trop. Med.* 1949, Sept., v. 25, No. 1, 78–81. [Spanish version 82–6.]

The author reviews briefly the literature on the treatment of tapeworm infestations with acridines [this *Bulletin*, 1946, v. 43, 939 : *Prensa Med. Argentina*, 1946, v. 33, 1657 ; *Horizontes Med.* 1947, v. 4, 73] and then reports on the treatment of 24 outpatients in Porto Rico with atebrin [mepacrine].

The patients were aged between 6 and 65 years, 18 were females and all suffered from *Taenia saginata* infestation. Their general health was good (lowest haemoglobin 9·7 gm., lowest red blood cells 3·26 millions per cmm.) Only those were accepted who had recently passed proglottids.

The patients were instructed to have light meals and to take 30 gm. of magnesium sulphate on the day before treatment. The next morning, on a fasting stomach, all adults were given 6 to 8 tablets of atebrin hydrochloride—two tablets every five minutes, with a glass of water containing 6 gm. of sodium bicarbonate.

Two or three hours later a dose of magnesium sulphate in a syrup of citric acid and water was given : two or three bowel movements usually occurred during the first hour, and the stools were examined at once.

Plasma concentrations of atebrin were not done.

In 13 cases the scolex was passed and in 11 the whole taenia was recovered : the proglottids, all alive, stained yellow from the drug.

The patients were followed up for two to 12 months ; only one has reported passage of proglottids two months after treatment. The results showed that previous dieting and purgation did not appear to influence the expulsion of the scolex ; but the author believes that such preparation makes finding it less difficult.

Eleven patients vomited, sometimes with nausea, within an hour of taking either the last atebrin tablet or the purgative. None had nausea and vomiting oftener than three times.

One patient, a girl of 17, became listless and stuporous after receiving the atebrin tablets and vomited yellow gastric contents after taking the drug and the laxative. She then became completely disorientated. As there was no bowel movement, a saline enema was given, without effect : the next morning, an enema was successful. The patient had by then recovered from the psychotic episode, but she could not remember it or why she was in hospital. She has been in good health for ten months and has not expelled any more proglottids.

The author concludes that atebrin hydrochloride appears to exert certain toxic effects, but not to any serious extent, when used against *T. saginata* infestations. He believes that the scolex is sufficiently injured to release its hold on the mucosa. The optimal dosage is yet to be determined : a smaller amount may be effective. *H. J. O'D. Burke-Gaffney*

HERNÁNDEZ MORALES, F. & STEVENSON, D. S. **The Treatment of *Taenia saginata* with a Hexylresorcinol Emulsion administered into the Duodenum.** *Puerto Rico J. Pub. Health & Trop. Med.* 1949, Sept., v. 23, No. 1, 87–90. [Spanish version 91–5.]

The authors refer to the previous use of hexylresorcinol in the treatment of *Taenia saginata* infestations [this *Bulletin*, 1932, v. 29, 739 ; 1933, v. 30 205 ; 1938, v. 35, 675].

It has usually been administered in crystoids and the authors find this unsatisfactory possibly because crystoids, dissolving slowly, reach their maximum concentration too low in the small intestine to affect the scolex They therefore used the drug in crystalline form and introduced it, in a mixture of water and acacia, into the duodenum by means of a tube *in situ*.

Hexylresorcinol causes a burning sensation of the tongue and may produce necrosis of the epithelium or of the mucosa of the stomach, but lesions tend to disappear within three days : as a strong precipitant of protein, hexylresorcinol cannot penetrate the tissues deeply, but alcohol will increase its solubility and its capacity to penetrate.

The authors treated 28 patients in Porto Rico, all of whom had *T. saginata* infestation. They were aged between five and 50 years and 23 were females. Most of them had received " home remedies " and nine had had various recognized forms of specific medication. Their general health was good: the lowest haemoglobin value was 10·3 gm. and the lowest red cell count 3·37 millions per ccm.

The patients fasted on the morning of treatment. A duodenal tube, with metal tip, was introduced into the stomach, the gastric residue aspirated and the patient turned in a right lateral decubitus position. He was told to swallow the tube slowly, at intervals of five minutes, until the duodenum was reached. In most cases the correct position of the tube was checked by fluoroscopy or films.

A mixture of 1 gm. of crystalline hexylresorcinol suspended in 30 cc. of water containing 1 gm. of acacia was introduced slowly through the duodenal tube at room temperature.

Occasional nausea was dispelled in a few seconds by stopping administration of the emulsion and having the patient take deep breaths. The authors found that liquids introduced directly into the duodenum tend to produce nausea : it is suggested that warm water introduced first would prevent spasm.

After the drug was given, the tube was left *in situ* for several minutes and some warm water introduced. The patient then sat up and, as he drank ice-cold water, the tube was slowly withdrawn. In one or two cases regurgitation occurred and cold water was given to dilute any of the drug present in the mouth. In contrast to experience with the instillation of extract of male fern, all patients tolerated the treatment well.

After the tube was removed, the patient remained for half an hour and then was allowed to go home. A liquid diet was ordered four hours later and a regular diet allowed next day.

No attempt was made to recover the scolex, since hexylresorcinol does not kill the parasite immediately.

All patients were followed up for more than a year.

Six patients passed segments between two and 4½ months after treatment. Five were treated a second time, with success in four. In the final analysis, 26 patients out of 28 were cured.

There were no toxic effects. Usually soft stools containing segments of *T. saginata* were passed the day after treatment. There were no complaints of burning pains in the mouth or epigastrium or of other abdominal pain.

The authors believe that hexylresorcinol in emulsion form is the drug of choice in the treatment of *T. saginata* infestation, since toxic effects are absent and purgatives and dietary restrictions are not necessary. It is also an excellent anthelmintic against other parasites. *H. J. O'D. Burke-Gaffney*

Sotolongo, F. Diagnostico del parasitismo por *Inermicapsifer cubensis* (Kouri—1938) Kouri 1940. [**Diagnosis of Infestation by** *Inermicapsifer cubensis*.] *Rev. Cubana Lab. Clin.* 1949, Oct.–Nov.–Dec., v. 3, No. 4, 131–46, 11 figs. on 2 pls.

This parasite, one of the family Davaineidae, was first described by Kouri in 1938 as *Raillietina*. Kouri regarded it as peculiar to Cuba, though cases might perhaps be met with in Porto Rico and Venezuela. Up to the date of the present paper (read at a laboratory meeting in 1947) Professor Kouri had reported 72 cases and had heard of 23 more, 95 in all. Of his 72, 45 had been found in Habana, 14 in Matanzas, nine in Las Villas, two in Pinar del Rio ; the other two were not located. Children are most infested ; 35 were under three years of age ; sex seemed to play little or no part, 38 were males, 29 females, in five the sex was not known. White children were most susceptible, at all events were by far the most infested. Of the 72, 60 were whites, two were half-castes, in ten the race was not stated.

There follows a description of the worm, with photographs of the proglottides, egg-capsules and ova ; diagnosis may be made from strobila passed in the faeces, or from the ova or the whole worm which may be passed after a drastic purgative. *H. Harold Scott*

Ginés, A. R. Estado actual de la hidatidosis en el Paraguay. [**Hydatid Disease in Paraguay.**] *Hoja Tisiológica*. Montevideo. 1949, Sept., v. 9, No. 3, 244–7.

The author observes that reading of some accounts and textbooks might lead to the inference that hydatid disease was endemic and important in Paraguay, but that this is quite a wrong idea. He refers to four cases : two in men in 1942, one an agricultural worker, aged 29 years, " with no signs, physical or functional " [but the tumour was the size of a foetal head and operation was refused] ; the other was a mason (*albañil*), aged 52, with pain in the shoulder, urticarial crises and a cyst as large as an orange. Two other cases, in women, one in 1945 with a thoracic cyst the size of an orange, the other in 1947, with a pleural cyst ; their ages were 28 and 27 years respectively.

Among more than a 1¼ million cattle slaughtered during the four years 1944–47 cysts were found in 438, or 34 per 100,000 (0·034 per cent.) ; 381 of the cysts were pulmonary and 57 in the liver. Hydatid disease, the author concludes, is not a serious problem among human diseases in Paraguay.

*H. Harold Scott*

BAUMANN, H. Epidemiologisch-diagnostischer Beitrag zur Ascaridiasis. [**Observations on Epidemiological Diagnosis of Ascariasis.**] *Offentl. Gesundheitsdienst.* Stuttgart. 1949, May, v. 11, No. 2, 52–5.

The following is a translation of the author's summary :—

In 432 stool examinations and 628 autopsies in Göttingen, the incidence of *Ascaris lumbricoides* infection was found to be 1·6 per cent.

In considering the differential diagnosis and the possibility of direct infection, identification of worm eggs and stool examinations of food-handlers are recommended in public health investigations where typhoid, paratyphoid and dysentery are suspected. *H. J. O'D. Burke-Gaffney*

KOZAR, Z. **Immunological Relationship of** *Ascaris lumbricoides* **var.** *humanum* **and var.** *suum* **studied** *in Vitro* **by the Method of Living Larvae.** *Bull. Inst. Marine & Trop. Med., Med. Acad., Gdańsk, Poland.* 1949, v. 2, Nos. 1/2, 61–70, 3 figs.

Guineapigs and mice were infected orally with infective eggs of the human and porcine strains of *Ascaris lumbricoides*. Blood was drawn off for serum preparation six to 12 days later, after which the animals were killed and migrating larvae were recovered from the organs by Baermann's apparatus.

The effects were then observed when larvae of either strain were placed in serum from animals infected with either strain. Precipitates were formed around both kinds of larvae in each instance and also when the larvae were placed in serum from human beings who were infected with *Ascaris*. It is claimed that this result confirms the opinion that there is no immunological difference between the human and porcine strains of *A. lumbricoides*.

*J. J. C. Buckley*

DE OLIVEIRA, G. G. Toxemias pseudo-gravidicas e parasitoses intestinais. [**Intestinal Parasitism and Pseudo-gestational Toxaemia.**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1947, v. 12, Nos. 31–32–33–34, 107–14.

The author, who is engaged in prenatal work, finds that certain symptoms which commonly occur during pregnancy—such as mild albuminuria, hydraemia, a certain grade of anaemia—are on that account ascribed to the pregnancy and the " toxins of pregnancy ", but when they occur in pregnant women who are also infested with parasites such as *Ascaris* and hookworms they are due to the parasitism and not to the pregnant state. Appropriate treatment of the parasitism, by resorcinol in the cases detailed, besides getting rid of the parasites, also clears up the toxic symptoms. Brief notes of 15 cases exemplifying this are given. *H. Harold Scott*

JOCHIMS, J. & WREDE, I. Über Zwischenfälle bei der Askaridenkur mit Bedermin. [**Episodes in the Treatment of Ascariasis with Bedermin.**] *Deut. med. Woch.* 1949, Oct. 28, v. 74, No. 43, 1308–9.

An interesting series of four cases, two of which ended fatally, is here recorded. One of those who recovered was ill for some nine weeks. The history of one of the former may be given in detail.

A girl of six years, infested with *Ascaris lumbricoides*, was given two capsules of Bedermin (1·2 gm.). Bedermin is a mixture of one part Ascaridol with six parts " Seretin ", a carbon tetrachloride preparation. The drug seemed to act well and 52 worms were expelled. Five months later the child's mother noticed more worms and brought her for treatment. The general condition was good,

but " eosinophiles were 27 per cent." A second dose of two capsules (1·2 gm.) was given with two tablespoonfuls of castor oil, which was vomited. Three tablespoonfuls of 20 per cent. magnesium sulphate were given in place of the oil, with good result. The child complained of feeling sick but ate a good dinner. In the afternoon she felt worse and in the evening vomited again. An enema resulted in the passing of 128 ascarides. The child had a restless night and the following day another enema brought 124 more worms. Vomiting recurred and general pains were complained of and the liver was a little enlarged and tender on pressure. Normal saline with 25 per cent. glucose was given intravenously, but the vomiting was uninfluenced and the child " appeared toxic ", with albuminuria and leucocytosis, but with no eosinophilia. Nervous symptoms now presented themselves, exaggerated reflexes, Babinski extensor, and delirium ; 72 hours after the Bedermin had been given the child died in coma.

Post mortem, the heart and liver were fatty and there were subpericardial haemorrhages ; there was nephrosis and bloody urine in the bladder.

The authors consider the possible causes of these mishaps. The dose of Bedermin used was that generally recommended. Was there anything wrong with the drug used ? It was sent to Bayer for examination, who reported that the sample used was 10 or even 15 years old [but nothing is said as to any change having taken place on that account]. Were the symptoms due to the tetrachloride or its split products ? Phosgene was not found on testing it. On the other hand, may the worms themselves have been the cause ? They were numerous and the amount of their toxin may have been great or the patient may have been allergic to it. The question is an interesting one but is left undecided. *H. Harold Scott*

Bellefontaine, L. Existence de *Wuchereria bancrofti* dans le territoire de Yahuma, district de Basoko. [**Presence of** *Wuchereria bancrofti* **in Yahuma, Basoko District.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Sept. 30, v. 29, No. 3; 251–4, 1 map.

The author, in the Belgian Congo, undertook a filarial survey in the Soku Sector in the Southern region of Yakuma. The survey covered 15 villages spread along a route which passes the division between the tributaries of the Lomami and of the Lopori. The details are shown in a map.

The examination took the form of scarification in the deltoid region : the thick films were taken between 9.30 and 10.30 p.m.

There were 54 persons examined, all adult males, most of them over 30 and many over 40 years. Of these, no less than 49 (90·74 per cent.) showed the presence of *Onchocerca volvulus*, 22 (47·4 per cent.) carried *Wuchereria bancrofti* and the same number had double infections.

The author points out that a more comprehensive survey would be of great interest, both from the epidemiological and pathological points of view.

*H. J. O'D. Burke-Gaffney*

Perry, W. J. **Studies on** *Mansonia xanthogaster* **and its relation to Filariasis in the South Pacific.** *J. Parasitology.* 1949, Aug., v. 35, No. 4, 379–82, 4 figs.

*Wuchereria malayi* was unknown in the islands of the Solomons group and in the New Hebrides before 1944. Recent dissections of *Mansonia xanthogaster* and other mosquitoes have failed to reveal any fully developmental infective stage larvae.

The larva of *Mansonia xanthogaster* was first found in 1945 on Aore Island and on Espiritu Santo, which latter island represents the type locality for the larvae and pupae. As in other members of the genus the immature stages attach themselves to the submerged roots and stems of aquatic plants. In these islands the only plant used by *Mansonia* appears to be *Pandanus* sp. which is believed to be a new host record. Development of this mosquito from egg to adult takes 21 to 26 days.

The larva and pupa of *Mansonia xanthogaster* are described and illustrated.

*H. S. Leeson*

Malhotra, S. L. **Filarial Eosinophiliosis.** *Indian Med. Gaz.* 1949, July, v. 84, No. 7, 292–5.

This report is based on six patients with a diagnosis of filariasis and one with a *Taenia solium* infection. In four cases microfilariae were found in the blood ; of these, three patients had symptoms of filariasis. In two cases no microfilariae were found, but both patients had symptoms suggestive of filariasis.

All the patients had asthmatic wheezing and several had more severe asthmatic attacks. All had a raised leucocyte count—10,000 to 18,000 per cmm.—with eosinophils from 40 per cent. to 80 per cent. Four of the cases of filariasis showed transient soft lung infiltrations. The sputum contained many eosinophils in some of the cases. In two cases the symptoms were improved by administration of stovarsol, and in one by neostibosan.

The seventh patient with the tapeworm infection had a spontaneous pneumothorax. His asthmatic symptoms improved after filix mas had been given and a complete worm recovered.

[The details that are given are not sufficient for the reader to judge whether there was any relation between the Loeffler's syndrome and the helminthic infections. In the highly endemic areas in India as many as 80 per cent. of the population may be infected with filaria with or without clinical signs.]

*L. E. Napier*

Dejou, L. Essais de traitement de l'eléphantiasis tropical du scrotum par la sulfamidothérapie prolongée, par la pénicilline et la streptomycine. [**Attempts at treating Elephantiasis with Prolonged Sulphonamide Therapy with Penicillin and with Streptomycin.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1948, v. 5, No. 1, 31–7.

Streptococci have frequently been isolated from patients with the lymphangitis of elephantiasis and many arguments have been put forward to support the view that they are the predominant organism in this condition. Sulphonamides have been used in the treatment : they produce a good result on the acute symptoms, but do not prevent the development of oedema and engorgement of the lymphatics which eventually produce elephantiasis.

The observations reported are concerned with cases of elephantiasis of the scrotum. There are two stages in this condition :—

Stage 1, in which the skin is slightly thickened, the cellular tissues are oedematous, but there is little sclerosis and the cutaneous and subcutaneous blood vessels are intact ; in this condition antibiotics have their maximum effect.

Stage 2, in which the skin is very thickened, verrucose and sclerosed, the deep tissues are infiltrated with oedema, and the blood and lymphatic vessels obliterated : in this stage medicaments have a limited zone of permeation, and the sclerosis is not reversible.

In the treatment of four cases the author concluded that sulphonamide therapy (159 to 179 grammes in three to four months in periods of ten to twenty days with intervals) caused a regression of the elephantiasis in early cases and that, in other cases of moderate enlargement, it ameliorated the condition, facilitated subsequent surgical intervention and prevented relapses.

The first patient was a European male aged 25 who had a scrotum enlarged to the size of a child's head : the skin was hot, thickened, fissured and oedematous. The testicles could not be distinguished. The duration was only one month. After a month of treatment with sulphonamides and penicillin, there was a marked improvement ; there was a marked reduction in size, the skin was softer, and the testicles could be felt easily. However, there was still some thickening along the median raphae and treatment was therefore continued for another three months : this resulted in further improvement.

The second case was that of a 60-year-old cultivator with elephantiasis of the scrotum of three years' duration. He was given 88 grammes of thiazamide [sulphathiazole] with considerable improvement.

The third patient had a large and thickened scrotum with a hydrocele. He was given three months' treatment with sulphonamides, penicillin and streptomycin. The thickening of the scrotum was reduced, but the hydrocele persisted.

The fourth patient had a scrotum the size of a coconut. He was given three grammes of sulphonamide a day for 20 days : the skin did not become much softer. He then had a plastic operation after which the wound healed rapidly.

*L. E. Napier*

Das, N. & Mukherji, M. **Successful Removal of an Elephantiasis Serotum weighing 70 lbs. (35 Srs.) in a very Poor Surgical Risk Case.** *Indian Med. Gaz.* 1949, Aug., v. 84, No. 8, 347–8, 2 figs. on pl.

Canet, J. & Jahan, P. Traitement de la filariose à *W. bancrofti* en Indochine par un nouveau filaricide : la l-diéthyl-carbamyl-4-méthylpipérazine ou 3.799 R.P. **Treatment of Filariasis due to *W. bancrofti* in Indo-China by a New Filaricide : l-Diethyl-Carbamyl-4-Methyl-Piperazine, 3,799 R.P. or Hetrazan.** *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 7/8, 408–13. [10 refs.]

In previous work the authors had treated six patients with neoarsphenamine and sulpharsphenamine (no success), and six with quinioblue and methylene blue (no success). Ten were treated with anthiomaline ; in six there was complete failure and in four there was a diminution by half of the microfilariae, lasting three months. Four patients were treated with sodium antimony tartrate, and one showed diminution of the microfilariae. Four patients were treated with Nesbosan (a Japanese preparation of pentavalent antimony) and none showed diminution of the microfilariae.

In later work, ten Tonkingese weighing 45–56 kgm. were treated with Hetrazan. All received about 400 mgm. daily for six to ten days. Eight of them received a second course ten days to a month later, consisting of 300–400 mg. daily for three to nine days. Finally five of the patients receive a third course 6–52 days later. Microfilariae disappeared completely from the blood of all patients. Three months later, microfilariae have reappeared solely in the blood of the two patients who received only a single course of treatment. One of the patients had a hydrocele, faintly chylous, and containing many microfilariae ; on the third day of treatment the microfilariae disappeared from the hydrocele as well as from the blood and the hydrocele fluid became clear. In nine of the ten patients, at the beginning of treatment there were symptoms lasting 48 hours consisting of pyrexia (38–39°C.), headache, and

nausea. These symptoms did not occur in nonfilarial persons taking up to 0·8 or 1·0 gm. daily and they are probably allergic. It is considered that Hetrazan is much more effective than any antifilarial drug previously tried.

*F. Hawking*

MURGATROYD, F. & WOODRUFF, A. W. **Loiasis treated with Hetrazan (Banocide).** *Lancet.* 1949, July 23, 147–9, 4 figs.

Eight European males and nine females were treated for *Loa loa* infection in London by the authors. Their infections had lasted from one to 24 years. Each was subject to Calabar swellings, the average period being about five years. A skin test with filarial antigen was positive in every case. The first six patients were given two mgm. per kgm. of Hetrazan only once daily (owing to limited supplies of the drug), but the later ones were given two mgm. per kgm. three times daily. Treatment lasted from ten to 21 days and total amounts of 1·2 to 10·5 gm. were given. On the day after the first dose, six of the patients complained of itching, and three of them had rashes—morbilliform, urticarial, and papulo-erythematous respectively. The rashes lasted only 48 hours, but the itching lasted 3–4 days; it was alleviated by Benadryl, 50 mgm. or Anthisan 100 mgm. thrice daily. In three other patients, cutaneous nodules about 0·5 cm. appeared and disappeared in two or three days. In three others, serpiginous linear swellings due to dead adult worms appeared under the skin. In the three patients who had microfilariae in the blood, these rapidly disappeared under treatment. No appreciable pyrexia occurred. Nausea occurred in four patients and headache in four.

As regards later effects, one patient had a recurrence of Calabar swellings three months after re-entering an endemic area, but this may have been a re-infection. All the rest have remained free, including nine who have been followed for more than six months. The filarial skin test has remained positive (eight patients studied), but the complement fixation test, previously positive in nine patients, has become negative in four out of five of those studied and diminished in the fifth. It is concluded that Hetrazan is a valuable filaricidal agent in *Loa loa* infections.

*F. Hawking*

MCMULLEN, D. B. **Notes on the Course of a Pinworm Infection.** [Research Notes.] *J. Parasitology.* 1949, Oct., v. 35, No. 5, 542–3.

A man of 43 and four members of his family were found to be infected with *Enterobius vermicularis* in January 1947. None of them experienced any discomfort.

The infection was studied in the main by daily examination with the use of the Scotch tape method. The average number of pinworm eggs after ten excursions across the tape under the low power of the microscope gave some idea of the intensity.

In May 1947, the patient left the U.S. for Japan. The rest of the family were cured with gentian violet. Daily swabs of the man were continued, to study the effect of changes of environment. Swabs were examined until the end of March 1948 (503 days) except for nine scattered days.

Three phases in the infection were observed, namely (1), the period in the family environment, (2) a transitory period soon after this and (3) a period when the infection was barely maintained and finally disappeared.

During the first period (137 days), worms descended and laid eggs on 63 days. The average number per excursion across the tape was 59·7. In the transitory period (61 days) worms descended on only 17 days, with an average egg count of 54·2.

During the first period, there was an average of 13·6 days a month that worms descended : in the transitory period this was 8·5 days.

Eggs were laid for the last time at the end of March 1948. From the end of the transitory period until then (eight months) worms descended only 12 times, an average of 1·5 times per month. The average egg count was 44·4.

In the first two periods, no rhythm in the appearance of the worms was noted ; in the third phase, periodicity was noticeable : the interval between migrations varied from 25 to 43 days.

Itching and " crawling of the worm " were the only symptoms noted. Symptoms and eggs were recorded 53 times, eggs alone 38 times and symptoms alone 12 times.

There was no evidence of hyperinfection nor evidence that the female worms returned to the colon, although descent of the worms often occurred on two to eight consecutive days. *H. J. O'D. Burke-Gaffney*

QUINTANAR, Enriqueta & OSORIO, María T. Sobre la presencia del *Enterobius vermicularis* en el apendice. [*Enterobius vermicularis* **in the Appendix.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, June, v. 10, No. 2, 215–17. English summary (3 lines).

The authors examined the washed contents and the interior of 874 appendices (758 from autopsy and 116 from operation) in Mexico City. They found *Enterobius vermicularis* in 12 per cent. of the former and 33·6 per cent. of the latter. No differences relating to age or sex were noted in the patients, who were from 20 to 50 years old. [See also this *Bulletin*, 1942, v. 39, 634.] *H. J. O'D. Burke-Gaffney*

STURSBERG, H. ; SCHÜFFNER, W. " Kritische Beleuchtung der Oxyuriasis-Therapie und Winke für die praktische Ausführung " (SCHÜFFNER : *Med. Klin.* 1949, 11 : 334). [**Critical Inquiry into the Treatment of** *Enterobius* **Infestation and Hints on Practice.**] *Med. Klin.* 1949, Oct. 7, v. 44, No. 40, 1292.

Referring to SCHÜFFNER's paper on this subject [this *Bulletin*, 1949, v. 46, 858] the author brings to notice a method of giving oil of chenopodium as an enema after a wash-out. He used the following : 10–20 drops of the oil, emulsified with 5 gm. of gum arabic in 100 cc. water, in 1–1½ litres of warm water, for *Ascaris* infestation, but found that even when the preliminary wash-out had produced no *Enterobius*, if the latter were in the bowel they were evacuated " in astounding numbers." Moreover, there was none of the risk of giving the drug by mouth and the worms were more easily attacked than from above, because an enema properly administered fills the large intestine up to the caecum and only those worms which are ensconced in the appendix would escape. Schüffner in a note agrees that the results as recorded by Stursberg are extraordinarily good. *H. Harold Scott*

BEARUP, A. J. *Trichinella spiralis* : **further Search for Infections of Man in Australia.** *Med. J. Australia.* 1949, Nov. 5, v. 2, No. 19, 673–5.

"An investigation of muscle from the diaphragm of 202 persons in Sydney showed one, possibly two, Trichinella infections. In the one certain case the subject had old and calcified cysts and was a person born outside Australia." [See this *Bulletin*, 1937, v 34, 882.]

BEARUP, A. J. **Examination of Wild Rats for *Trichinella spiralis*.** *Australian Vet. J.* 1949, Oct., v. 25, No. 10, 229–30.

"No Trichinella infections were found in 200 wild rats collected in the City of Sydney."

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## DEFICIENCY DISEASES

VAN DEN BERGHE, L. & VANDER BORGHT, H. Recherches sur le taux de protéines du sang et du plasma chez les indigènes du Kwango (Congo belge). [**Protein Levels in Whole Blood and Plasma of Africans in Kwango, Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Sept. 30, v. 29, No. 3, 365–7.

In the course of a dietary and nutrition survey, the levels of total protein in plasma and whole blood were measured by the copper sulphate specific gravity method of van Slyke.

Of over 500 estimations of total plasma protein, 85·7 per cent. were within normal limits (taken as 6·3 to 7·7 gm. per 100 ml.); in 8·8 per cent. the level was above normal limits, in 5·5 per cent. below.

Haemoglobin levels, calculated from specific gravity of whole blood, were below the normal range in 81·9 per cent. of subjects (normals taken as 14·2–17·4 gm. per 100 ml. for men and 12·8–15·7 gm. per 100 ml. for women). No differences related to age, sex or race were noted. The low haemoglobin levels are attributed mainly to the almost universal hookworm infestation. In 15 children brought up under good environmental and dietary conditions in a Mission, the levels were normal. *Dean A. Smith*

LALOUEL, J. "M'Buaki" et "Diboba" au Congo Français. [**"M'Buaki" and "Diboba" in the French Congo.**] *Méd. Trop.* Marseilles. 1949, July–Aug., v. 9, No. 4, 605–8.

These two diseases belong to a group of syndromes characterized by depigmentation and oedema which were first described in the Belgian Congo in 1941 by PIERAERTS [this *Bulletin*, 1942, v. 39, 99; 1947, v. 44, 225] and by DOUCET in 1946 [*ibid.*, 451]. Other names used locally are "*Nzadi*" and "*Lupusu*". These conditions have formerly been attributed mainly to ankylostomiasis.

The present paper describes 31 cases seen in the French Congo. All were children of extremely poor casual labourers, and had lived almost entirely on cassava (manioc). Their ages varied from 3 to 10 years, and all carried hookworm infestation of varying severity.

Depigmentation was most noticeable around the alae nasi and over the "butterfly" area of the face. The hair lost its gloss and texture and became soft and straight, and of a dirty brown colour. Oedema appeared first in the face, but was soon found in the legs. Hypochromic anaemia with variable eosinophilia was usual. Some patients had bradycardia.

Neurological changes have not been described in this condition before: five of these 31 children had flaccid paraplegia of the legs with wasting and loss of reflexes. Nine of the cases were very severe, and of these five died. Removal of the ankylostome infestation brought about, by itself, no improvement, but recovery in most cases followed feeding on a good all-round diet with administration of fruits and synthetic vitamins.

The condition is regarded as one of multiple deficiency aggravated by hookworm infestation and chronic malaria.

[In many clinical respects this syndrome appears to resemble that of kwashiorkor or malignant malnutrition, but there is no record that these

patients had enlarged livers or evidence of impaired liver function. It is possible that there is an important aetiological difference: in these "M'Buaki" cases the multiple deficiency may be *dietary*, whereas in kwashiorkor it is generally thought to be conditioned by failure of digestion and absorption due to liver, pancreatic and intestinal dysfunction based on protein deficiency with relative excess of carbohydrate. See below.] *Dean A. Smith*

PIERAERTS, G. Syndrôme de depigmentation-oedème (Kwashiorkor) au Kasaï. Essais thérapeutiques. II. [**Depigmentation-Oedema Syndrome (Kwashiorkor) at Kasai, Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Sept. 30, v. 29, No. 3, 329–37.

Although the majority of cases of kwashiorkor respond satisfactorily to a good diet including a high intake of readily absorbable protein, usually in the form of milk, there is a small proportion in whom intestinal function is so far disordered that oral therapy has no effect.

Believing that hypoproteinaemia is the fundamental trouble in this condition, at once the cause and the effect, and being impressed by the onset of the disease in a previously apparently normal child after a moderate haemorrhage, the author treated six cases with subcutaneous infusions of human plasma. There was no immediate change but, in five cases, after 500 ml. of plasma had been administered, there was a large diuresis and a great improvement in the general condition, including return of appetite. Thereafter it appeared that the digestive and absorption mechanism had recovered their capacity, and recovery followed on dietary measures alone.

The author emphasizes that restoration of plasma protein level and reduction of the oedema is not the equivalent of cure but is necessary before recovery can take place. Nor does this trial shed any light on the problem of which protein component or fraction is responsible for the condition. Therapeutic trails of choline and methionine have given disappointing results. Further work on the lines indicated should rapidly narrow the field of search. [The author identifies the syndrome as seen in the Belgian Congo with kwashiorkor, but, like LALOUEL (above), makes no comment on the state of the liver.] *Dean A. Smith*

BERGERET, C. Un syndrome de dénutrition maligne de l'enfant noir le "Kwashiorkor". [**A Syndrome of Malnutrition in the Negro Child, "Kwashiorkor".**] *Bull. Méd. de l'Afrique Occidentale Française.* 1948, v. 5, No. 2, 257–69.

A clinical account of "kwashiorkor" is given, and is based on observations on thirty-seven cases among several hundred infants admitted to hospital in Dakar. Those already familiar with the syndrome will find little new in this paper. It does, however, extend the recorded geographical distribution of the disease. The author points out that the condition is not very common in Dakar, that it is not always associated with a bad dietary history and that infections, notably malaria, intestinal parasites and congenital syphilis, may be important predisposing factors. *R. Passmore*

BLANKENHORN, M. A. **Deficiency Diseases in the Cincinnati General Hospital. A Ten Year Study.** *J. Amer. Med. Ass.* 1949, Aug. 27, v. 140, No. 17, 1315–17.

During the period 1939–48 there were, among the 200 monthly new admissions to the Cincinnati General Hospital, 106 cases of pellagra, 48 of beriberi, 33 of scurvy, 14 of riboflavin deficiency, four of sprue and one each of vitamin A and D deficiencies. During the previous ten years there had been

a rise in the incidence of pellagra from 0·3 to 1·5 per cent. of admissions. This was attributed mainly to increased zeal and acuity in diagnosis on the part of the physicians. During 1939–48, with the same individual physicians, the incidence fell to zero. This decline started before the use of enriched flour became general and continued in spite of a considerable rise in cost of most foodstuffs, especially lean meat and vegetables. The probable cause was dietary reform initiated by public health education.

The few cases of scurvy were mainly attributable to bad dietary habits. There has been little decline in incidence of this disease in spite of a 20 per cent. fall in the price of citrus fruits.

Of all the deficiency diseases recorded, one-half were associated with other acute or chronic diseases and one-third with chronic alcoholism.

*Dean A. Smith*

Silva, F. & Monteiro, A. B. Pelagra na Bahia. [**Pellagra in Bahia.**] *Arquivos Univ. Bahia Facul. de Med.* 1948, v. 3, 165–9, 2 pls.

An account of 7 cases.

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## HAEMATOLOGY

de Muynck, A. Het hemoglobinegehalte bij de zwangere vrouw in de streek van Luebo. [**Haemoglobin Standards in Pregnant Women in the Luebo Area.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Sept. 30, v. 29, No. 3, 259–76. [11 refs.]

Ranganathan, S. & Patwardhan, V. N. **Alkaline Phosphatase in Erythrocytes.** *Indian J. Med. Res.* 1949, Apr., v. 37, No. 2, 233–40.

"1. The presence of an alkaline phosphatase in the red blood cells of sheep, rat, pig, guinea-pig and man has been demonstrated.

"2. The alkaline component of the erythrocyte phosphatases has been separated from the acid phosphatase and its conditions of action studied.

"3. Zinc sulphate and sodium cyanide have been shown to exert a powerful inhibiting action on the phosphatase in M/200 concentrations. Sodium fluoride was found to be comparatively a weak inhibitor.

"4. In rat rickets, the plasma alkaline phosphatase shows a very large decrease in activity whereas the erythrocyte alkaline phosphatase shows no appreciable change."

East African Med. J. 1949, Aug., v. 26, No. 8, 228–9. **Recovery from Anaemia.** Proceedings of a Mulago Staff Clinical Meeting, 14th May 1949.

Four cases of anaemia in Uganda Africans are recorded with interesting response to treatment.

The first was a man with the iron deficiency anaemia commonly seen at Mulago, of a normocytic hypochromic type. Hookworms were present, but no treatment was given for three weeks. The patient was on ordinary hospital diet, with meat and milk supplements. His anaemia became worse. Then 1,125 *Necator americanus* were removed. Without any iron therapy the haemoglobin rose slowly, but the red cell rise was greater and the anaemia changed to the microcytic hypochromic type of iron deficiency anaemia usually seen in Europe. Within six months blood changes were restored to normal on hospital diet alone. Evidently this iron deficiency was not of dietary origin, but was due to hookworm infestation. A moderate diet cured it completely, but only after worming had been carried out.

The second case was similar, but more severe. After removal of 1,353 hookworms, two *Ascaris* and one *Taenia saginata* recovery was only partial, but iron treatment increased the circulating haemoglobin 6½ times within a month. The author believes therefore that severely anaemic patients may be wormed with safety, if tetrachlorethylene is used instead of carbon tetrachloride and the liver protected with insulin and sugar immediately after the purge.

The third and fourth patients were men with very large spleens and " precoctic " anaemia [this *Bulletin*, 1949, v. 46, 664, 966]. Antimalarial drugs did not affect the anaemia. The leucocytes suggested a bacterial infection, but blood culture and agglutination tests were negative. However, several courses of sulphathiazole were given, the anaemia improved slowly and simultaneously the large spleens, originally palpable in the right iliac fossa, contracted into the left hypochondrium. In one case, haemoglobin rose from 4·49 gm. on admission to 14·1 gm. after five months of intermittent sulphathiazole therapy.

It is suggested that the anaemia and splenomegaly were both due to an unknown infection, treatment of which cured both of its manifestations.

*H. J. O'D. Burke-Gaffney*

Pauling, L., Itano, H. A., Singer, S. J. & Wells, I. C. **Sickle Cell Anemia, a Molecular Disease.** *Science.* 1949, Nov. 25, 543–8, 4 figs. [16 refs.]

Godfried, E. G. Sikkelcelanaemia. [**Sickle Cell Anaemia.**] *Nederl. Tijdschr. v. Geneesk.* 1949, Sept. 24, v. 93 (iii), No. 39, 3377–80.

At a meeting of the *Nederlandse Internistenvereniging* (Dutch Association of Physicians), a case of sickle-cell anaemia was described in a girl of 13 from Surinam, with a typical abdominal crisis and blood picture. She was treated in an oxygen tent in view of the known fact that anoxaemia increases the sickle cells. Subjective relief was great and the blood improved rapidly, a reticulocyte crisis accompanying a steady increase in haemoglobin and red cells. The dilated heart also decreased in size.

The child's Wassermann and Kahn reactions were positive on one occasion but not again. The mother's reactions were negative and this is thought to have been a non-specific reaction, no other signs of syphilis being found.

*A. L. Winner*

Beet, E. A. **The Genetics of the Sickle-Cell Trait in a Bantu Tribe.** *Ann. Eugenics.* 1949, June, v. 14, Pt. 4, 279–84, 1 folding pl. [17 refs.]

Three hundred and eight children aged 6–18 years of the Lala tribe were studied ; 13·6 per cent. showed the sickle-cell trait. Family studies showed that it behaves as a Mendelian dominant. It is suggested that sickle-cell anaemia occurs in those with a double dose of the gene—the homozygotes.

*J. A. Fraser Roberts*

Lehmann, H. & Raper, A. B. **Distribution of the Sickle-Cell Trait in Uganda, and its Ethnological Significance.** [Correspondence.] *Nature.* 1949, Sept. 17, 494–5.

These observations cover the whole Protectorate of Uganda, some 5,000 persons having been investigated. There are remarkably large differences between the various tribes and language groups. In the Hamitic group the proportion of persons with the sickle-cell trait is uniformly very low, the average being only 2·6 per cent. There is one exception, however, the Teso tribe, which shows 18 per cent. ; it is pointed out that in physical characteristics this tribe is very different from the rest. Excepting only the Madi of the Sudan

border, who give a very low figure, the Nilotic tribes all show about 25 per cent. The Bantu tribes show much variation—from 8 to 45 per cent.—the incidence being inversely proportional to the amount of contact with the most recent Hamitic invaders. The highest figure of 45 per cent. is given by a secluded tribe living west of the Ruwenzori range. The authors consider that these differences should make a useful contribution to the physical anthropology of Central Africa. *J. A. Fraser Roberts*

LEHMANN, H. & MILNE, A. H. **The Sickle-Cell Trait in relation to Haemoglobin Level and Anaemia.** *East African Med. J.* 1949, Sept., v. 26, No. 9, 247–54. [17 refs.]

Anaemia and sicklaemia are both common in East Africa and the authors in Uganda studied the possible correlation between the two in several hundred Africans. The subjects were mostly school children in Uganda or Tanganyika, but included Makerere College students and the staff of two veterinary laboratories. They were divided into those with a blood haemoglobin level above 14 gm. per cent. and those below : sicklaemia incidence was determined in both groups.

It was noted that a haemoglobin level below 14 gm. per cent. was rare in school children above 15 years. That a true anaemia was present in those having a level below 14 gm. per cent. was proved by the results of treatment with iron : of 38 children at one school thus treated for three months, 20 showed a rise of haemoglobin above 14 gm. per cent. Similarly, three of ten anaemic children treated with iron for two months improved while seven untreated remained stationary or deteriorated in their haemoglobin levels. This is shown in detail in a table.

Another table compares age and haemoglobin levels in 841 children in three schools. The percentages with haemoglobin levels below 14 gm. per cent. at ages 5–10, 11–15 and 16–25 respectively were 31, 14 and 0·4 (in the last group there was only one such out of 227 subjects).

Details are given of 294 African males in two districts. They were divided into four age groups, namely old men, adult men, boys and male babies : there were no obvious differences in the incidence of sicklaemia in these groups, the average percentage being about 29 (range, 25 to 33 per cent.).

Finally a table shows that among 567 Africans with haemoglobin levels above and below 14 gm. per cent. there was no significant difference in sicklaemia, which amounted to 98 out of 486 [20 per cent.] and 21 out of 81 [25 per cent.] respectively.

This lack of significant correlation suggests that the sickle-cell trait does not make a person more susceptible to the common causes of anaemia in East Africa. Sickle-cell anaemia itself is rarely seen, but anaemias from other causes are common, so that it is important to exclude them before sickle-cell anaemia is accepted as the sole diagnosis in a haemolytic anaemia in a patient who is a sickler.

Some of the fallacies of such diagnoses are discussed and these included the " precoctic " picture [this *Bulletin*, 1949, v. 46, 966], bone changes, and sickling *in vivo*. A case is quoted to demonstrate the last-named diagnostic difficulty.

In discussion, the authors review the literature on the sickle-cell trait in East Africa [this *Bulletin*, 1945, v. 42, 825 ; 1946, v. 43, 243 ; 1949, v. 46, 665, 774, 966] : they have found it to be higher in Uganda than had previously been assumed ; some of the pioneer work may now have to be reviewed, particularly in view of the tribal differences noted [see above]. The significance of reticulocytosis in differential diagnosis is discussed.

*H. J. O'D. Burke-Gaffney*

LEHMANN, H. **Haemogram, Serum Protein and Plasma Volume of Healthy, Well-Nourished East Africans in Uganda.** [Correspondence.] *Nature.* 1949, Dec. 3, 954–5.

For the purposes of an investigation on anaemia in Uganda [this *Bulletin*, 1949, v. 46, 664] the author undertook the establishment of haematological and other values, so that the degree of recovery could be assessed.

The subjects were 34 healthy male adults of the African upper class who could afford as much food as they wanted, but were in fact mostly on a vegetarian diet. Thirteen students, who consumed meat and milk regularly, were compared with 14 other members of the group who were near-vegetarians.

There was no significant difference between the two groups in the haemogram and the total serum protein values: but in the students, serum albumin was significantly higher and globulin correspondingly lower. In the whole group of 34, there was a negative association between albumin and globulin levels. the coefficient of correlation being —0·7.

Although the subjects wore shoes and were thus protected against mass hookworm infestation, study of the stools of 22 showed that half of them carried some hookworms. The haemogram and protein values did not differ in those infested, nor was any alteration of the haemogram found in six of them who were purged of their worms. Eight of the volunteers carried the sickle-cell trait: they did not differ from the others in their haemogram, though as the author and his colleagues have noted previously, no correlation was to be found between anaemia and sicklaemia; the incidence of the sickle-cell trait was shown rather to depend on the tribal composition of the population [see above].

Eleven of the subjects permitted plasma volume estimations: the total circulating values agreed with those found in healthy Europeans, North Americans and Indians.

Detailed figures of these findings are shown in two tables. The author concludes that, except for the albumin/globulin ratios the various values concerned were the same as those found in Caucasians and in Indians [this *Bulletin*, 1947, v. 44, 672]. *H. J. O'D. Burke-Gaffney*

RIGDON, R. H. **Sudden Death during Pregnancy in Sickle Cell Anemia. Review of Literature and Report of a Case.** *Southern Med. J.* 1949, Dec., v. 42, No. 12, 1032–7, 3 figs. [34 refs.]

GODFRIED, E. G. **Sickle Cell Anemia treated by Oxygen Tent.** *Acta Med. Scandinavica.* 1949, Nov. 7, v. 134, No. 6, 440–43. [10 refs.]

Report of a case.

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## VENOMS AND ANTIVENENES

CHATTERJEE, A. K. **Studies on Snake Venoms. Part I. The Isolation of an Inhibitor of the Cytochrome-Cytochrome Oxidase System from Cobra Venom and Study of the Effects of pH, Temperature and Ultra-Violet Rays on its Stability.** *Indian J. Med. Res.* 1949, Apr., v. 37, No. 2, 241–8, 1 graph.

DOSSENA, P. Recherches sur l'influence des hormones sexuelles dans l'intoxication expérimentale par le venin de naja flava (Cape cobra). [**Study of the Influence of Sexual Hormones on Poisoning by the Venom of *Naja flava*.**] *Acta Tropica.* Basle. 1949, v. 6, No. 3, 263–7.

Two studies were carried out in this research. First, an estimation of the m.l.d. of the venom of *Naja flava* in mice, white rats, and guineapigs, and these were found to be 0·02, 0·2 and 0·24 mgm. respectively. In the course of these tests the author observed that, in general, the female animals showed

more resistance than the males—at all events that was his impression—and accordingly he carried out a second series of tests to find out whether the sexual hormones played any part in this phenomenon. He, therefore, injected 6 male guineapigs with Perandren " Ciba," and another 6 with Ovocycline " Ciba," and two lots, of 6 each, of female guineapigs with Ovocycline " Ciba " and Progesterone " Ciba." As these compounds are in oily suspension absorption is slow, so two injections were given, one six days before the venom was injected and the other on the day before.

The hormones made no difference and all that could be inferred was that " female animals responded with less regularity to intoxication by the venom " of *Naja flava*. *H. Harold Scott*

Del Pozo, E. C. & Derbez M., J. Relaciones entre la actividad anticolinesterásica, las propiedades de activación muscular y la toxicidad de los venenos de diversos alacranes de México. [**The Relation between the Anticholinesterase Activity and the Toxicity of the Venoms of Mexican Scorpions.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, June, v. 10, No. 2, 203–13, 1 fig. English summary.

In 1947 Pozo and Aguiano noted the anticholinesterase action of scorpion venom and its effect on the motor activity of striated muscle. They found, however, that there was no actual correlation between the two, that is, between the cholinesterase activity and the toxic effects.

They devised series of experiments to test this, using the venom itself and the telsons of three Mexican scorpions, *Centruroides noxius*, *C. suffusus suffusus* and *C. limpidus limpidus* macerated in 0·85 per cent. NaCl. Tubes were put up containing varying amounts of these venoms or macerates, the volume being made up to 2 ml. in each case. To each tube of a series was added an equal volume (0·1 to 0·3 ml. according to the series) of human serum as the source of cholinesterase. After 10 minutes at room temperature there was added to each tube 200 microgrammes of acetyl choline hydrochloride in a 1 : 5000 solution carefully neutralized. After another 10 minutes, 0·5 ml. of N/3 HCl and 1 ml. of 1 : 100,000 solution of physostigmine sulphate. Next, 0·5 ml. of a buffer solution (*solución amortiguadora*) of phosphates was added and the tubes were heated to boiling on a water bath. In each series controls were set up without acetyl choline and without venom. The actions of the different tube-contents on the rectus abdominis muscle of a frog were compared with those of known quantities of acetyl choline.

There is no need to describe the results in detail. Suffice it to say that " there was no correlation between the anticholinesterase activity and the toxicity as determined in mice, nor between it and the power to activate striated muscle, and that " the anticholinesterase activity of the macerates represents an insignificant side action."

The actual toxicity of the different venoms was found to be greatest in *C. suffusus suffusus*, next *C. noxius*, and least in *C. limpidus limpidus*. The venom of *C. limpidus tecomanus* was also tested and proved to be 12 times as potent as that of *C. s. suffusus*. *H. Harold Scott*

## DERMATOLOGY AND FUNGUS DISEASES

Reilly, E. B. & Steel, H. H. **Mycetoma : Report of a Case of Actinomycotic Variety.** *New England J. of Med.* 1949, Dec. 8, v. 241, No. 23, 900–905, 3 figs. [49 refs.]

" A case of mycetoma, probably of the actinomycotic variety, is presented. Of interest is the fact that sensitivity to an extract of *Aspergillus niger* was demonstrated.

Various therapeutic agents, including iodides, Fuadin, sulfadiazine, penicillin and streptomycin, were used, without benefit to the patient. Local applications of potassium permanganate, tyrothricin and gramicidin likewise were of no appreciable aid.

An uneventful recovery followed adequate surgical amputation."

NEGRONI, P. Estudios sobre el *Coccidioides immitis* (Stiles). I. Micelio vegetativo y de fructificación. [**I. Vegetative Mycelium and Fructification.**] *Mycopathologia*. The Hague. 1949, Aug. 30, v. 4, No. 4, 315–20, 7 figs. (5 on pl.). [12 refs.] English summary.

——. Estudios sobre el *Coccidioides immitis* Rixford et Gilchrist. II. Estudio micologico de las cepas autoctonas y revisión del granuloma coccidioidal en la Argentina. [**Mycological Study of Indigenous Cultures and Revision of Coccidioidal Granuloma in Argentina.**] *Ibid.* 321–6, 4 figs. [21 refs.] English summary.

[See this *Bulletin*, 1949, v. 46, 1173.]

DUEMLING, W. W. **Progressive Disseminated Coccidioidomycosis.** *Arch. Dermat. & Syph.* 1949, Nov., Pt. 1, v. 60, No. 5, 781–9, 5 figs. [Refs. in footnotes.]

A general discussion and report of 2 cases in the United States.

DE MONTEMAYOR, L. Estudio de las propiedades biológicas de varias cepas de hongos patógenos causantes de la Cromomicosis, y de especies vecinas saprofitas y patógenas. [**Study of the Biological Properties of the Different Strains of Pathogenic Fungi causing Chromomycosis, and the Allied Saprophytic and Pathogenic Species.**] *Mycopathologia*. The Hague. 1949, Aug. 30, v. 4, No. 4, 379–83. [11 refs.]

"The English summary appended to the paper is as follows :—

"The assimilation of sugars and nitrogenous compounds by the methods utilized by Mackinnon and collaborators at the "Instituto de Higiene" of Montevideo allow us to appreciate that the agents of chromomycosis are so closely related as to justify the opinion of Thom and Langeron ; that is to say, that they may be joined together in only one genus. The number of species is a problem more difficult but our results are not against a unicist criterion. *Phialophora compactum* has the same biological properties as *P. verrucosa* and *P. Pedrosoi*.

"On the other hand *Phialophora Jeanselmei*, an agent of black maduromycosis has different biological properties as the agents of chromomycosis.

"Common saprophytic strains of the genus *Hormodendrum*, well known contaminants of our cultures, may be easily distinguished from the agents of chromomycosis which may produce an hormodendrum-like type of growth."

DE MELLO, M. T. **Rhinosporidiosis.** *Mycopathologia*. The Hague. 1949, Aug. 30, v. 4, No. 4, 342–8, 1 map & 6 figs. on pl. [22 refs.]

"In another paper the author has presented a revision of the world literature on Rhinosporidiosis. With these data and other accumulated since then, he was able to compute the world casuistic of this mycosis as 442 cases in man and 39 in domestic animals.

"After a few considerations on the mycosis and its etiological agent, together with some of his experiences on the subject, the author summarizes the cases observed in Brazil both in man and in domestic animals."

## TROPICAL OPHTHALMOLOGY

BELLECCI, P. Fattori climatici ed andamento epidemiologico delle congiuntiviti in Libia. [**Climatic Factors in the Epidemiology of Conjunctivitis in Libya.**] *Ann. di Med. Nav. e Colon.* 1947, Jan.–Apr., v. 52, No. 1, 35–62, 6 figs. [32 refs.]

The bacterial causes of conjunctivitis vary in different parts of Africa ; the condition may be associated with the Koch-Weekes bacillus, with that of Morax-Axenfeld, the pneumococcus, the gonococcus and others. Also, curves have been plotted to find out the relation of the prevalence of conjunctivitis to the range of temperature, the rise and fall of the Nile, the humidity of the atmosphere, the intensity of light, the effect of dust and the plague of flies at different seasons. Tables are given showing the monthly averages of cases of trachoma and acute conjunctivitis, the relative humidity, temperature and cloudiness for 15 of the past 30 years. Also, graphs indicate the same relations for different eye-diseases. The author has been a practising oculist for 20 years and he has found that in the winter months chronic cases are very often met with, acute cases rarely, whereas in the hot season acute cases increase some tenfold ; the rise begins in May and June and continues until October or November. The author sums up his experience by saying that cloud and sunshine play a large part in the prevalence of conjunctivitis and trachoma, whereas dust, wind and the degree of humidity of the atmosphere are of minor importance in this respect. *H. Harold Scott*

TAKTIKOS, G. **Trachoma Control in Greece.** *Arch. d'Hygiène.* Athens. 1948, July–Dec., v. 6, Nos. 7,12. [In Greek 123–36. English summary 219–21.]

Trachoma control in Greece is discussed by Taktikos. He points out that trachoma is one of the most dangerous social calamities in the world and, slowly and often unnoticed, causes greater damage than any other infectious disease. The number of cases all over the world is estimated at from 90 to 100 million, representing 1/25 of the population of the earth. Its incidence is more frequent in the countries around the Mediterranean Sea, among which Greece is included.

He says there are four methods for estimating the incidence of trachoma in a country. General census, sample surveys, school index and army index. Of these, the first is the most efficient. Trachoma to a large extent was introduced into Greece in 1923–24 when large numbers of refugees immigrated from Asia Minor, where trachoma was endemic. At that time many anti-trachoma clinics were established in camps and hospitals. The Anti-Trachoma Inspectorate was formed and steps were taken to make a survey to estimate the extent and distribution of the disease and to establish anti-trachoma clinics with eye specialists in charge of them. In 1937, the Director General of Hygiene formed a large committee of Professors of the University and other specialists to co-operate in the successful campaign against trachoma. This committee stated that the anti-trachoma control should cover the following four points : trachoma investigation ; treatment of infected persons in schools, orphanages and hospitals ; protection of the non-infected part of the population ; efficient organization of the anti-trachoma control.

Unhappily on account of the war, these recommendations could not be fully carried out. In 1939 a law was passed giving the anti-trachoma organization a legal standing with permanent posts filled by men with special qualifications. In the war years, in spite of great difficulties, the work continued and experimental tests with sulphonamide drugs in the treatment of trachoma, were carried out. The Anti-Trachoma Service has tested from time to time many

new drugs in trachoma cases. Sulphonamides and albucid were tried in 1943. New tests were made in 1947 with Lutazol or G.33 [this *Bulletin*, 1942, v. 39, 888], and Ophtazol, advocated by BURNET, CUÉNOD and NATAF.

The Anti-Trachoma Service has given special attention to children, saving the healthy ones from infection, treating the already stricken ones and saving them from blindness. As a result of the war serious problems arose such as malnutrition, starvation and the loss of parents.

Orphanages have now been established for parentless children infected with trachoma, where they receive treatment and care. In 1944 a survey on trachoma among children receiving milk from the Distribution Centres of the International Red Cross was made by the Anti-Trachoma Service. These children were from 6 months to 7 years of age. The number examined was 45,000. The rate of incidence among children is 1·12 per cent. in Athens and 5·5 per cent. in Piraeus. *E. O'G. Kirwan*

TORRES, A. L. Tracoma. Sua epidemiologia e profilaxia. [**The Epidemiology and Prevention of Trachoma.**] *Hospital.* Rio de Janeiro. 1949, June, v. 35, No. 6, 805–17. [12 refs.] English summary.

Though containing nothing really fresh this article summarizes the author's experience with trachoma and is thus interesting. He remarks on and discusses the modes of transmission by direct contact and indirectly by towels, pillow-cases, sheets, and by flies, assisted by poverty and overcrowding and climatic conditions such as sunshine and dust causing ocular irritation. The geographical distribution in the world generally is mentioned briefly and then in more detail the chief sites of infection in Brazil, there being 3 main foci: Ceará, São Paulo, and Rio Grande do Sul. He then refers to the distribution by race, sex and age, and from a study of 3,416 cases found that nearly one-third, 1,032, or 30·2 per cent., were under 5 years of age, 829 (24 per cent.) were between 5 and 10 years, and 882 (25·8) were in their second decade. Prophylaxis recommended is on the usual lines: isolation into special colonies where the endemicity is high, special schools for the infected, quarantine of infective immigrants, compulsory notification, education and propaganda and, of course, thorough treatment of patients by sulphonamide drugs.

*H. Harold Scott*

See also p. 248. SOTO, **A reação leprótica do ponto de vista ocular.**

## MISCELLANEOUS DISEASES

CAMERON, T. W. M. **Diseases carried by House Mice.** *Canadian J. Comp. Med.* 1949, Oct., v. 13, No. 10, 262–6.

Most of the work on the epidemiology of diseases transmitted by rodents has been concentrated on rats: practically none has been devoted to the most domesticated rodent, the house mouse. Even though this species may play a relatively minor part in such transmission, it is on occasion a source of infection. The present paper examines what is actually known about this subject.

The author considers communicable diseases common to mice and men under a number of possible methods of rodent transmission, namely by biting; by infecting food with droppings or urine; by being eaten; indirectly, *via* cats, dogs, bloodsucking insects and mites; or (remotely) by dying in and contaminating a water supply.

Mice do not frequently bite man, but *Spirillum minus* does occur naturally in them and they can in any case transmit rat-bite fever to cats, dogs, ferrets and weasels, which can in turn convey it to man by biting.

Contamination of food by droppings is a habit for which house mice have a particularly favourable opportunity. They can in this way infect man with *Salmonella* organisms and with *Hymenolepis nana* and *H. diminuta* (though the latter is rare in man).

Mice do not contract leptospirosis frequently in nature, possibly because of their dislike for water, but they are easily infected experimentally. There are, however, records of natural infections and the urine of infected mice can thus contaminate food and water and initiate Weil's disease.

There is no evidence that man has been infected with disease by eating mice : but two important worms in cats are transmitted in this way.

It is well known that mice may transmit disease indirectly, as in the case of plague and typhus. House mice are apparently not often infested with plague fleas, although they are suitable hosts, possibly because their small size prevents any heavy infestation. At least one outbreak of murine typhus was traced to house mice. The recently described disease rickettsialpox is a mouse disease and is transmitted from mouse to man by a mite.

The fungus disease, favus, may be conveyed to man by mice directly or through the medium of cats thus infected.

There are some mouse diseases which seem to occur in man or at any rate resemble some which do, *e.g.*, lymphocytic choriomeningitis, histoplasmosis (though the identity of the organism in mouse and man has not been proved), and tularaemia.

There is no evidence that mice convey poliomyelitis in man, but the virus of Theiler's disease in mice is very closely related to the poliomyelitis virus and the lesions greatly resemble those of experimental poliomyelitis in mice. Many authorities believe that Theiler's virus and that of poliomyelitis had a common origin in the mouse.

The author stresses that this list of diseases known to be transmitted by mice cannot be presumed to be complete : for too little work has been done on mice to justify such a presumption and much more should be carried out.

*H. J. O'D. Burke-Gaffney*

BRAUNECK, H. W. F. **A Case of Human Myiasis.** [Memoranda.] *Brit. Med. J.* 1949, Dec. 10, 1335.

Human myiasis is uncommon in Britain and the author, who was medical officer in a German P.O.W. working camp in Buckinghamshire, saw a case there in a German aged 27.

The patient had had a radical operation for left otitis media in 1940, and had since had a purulent discharge from the ear which resisted treatment.

In the hot summer of 1947 he was working out of doors and in late September, he complained of intensification of the ear trouble, with pain of 2 days' duration and a pink-coloured discharge.

Auriscopic examination revealed the presence of actively moving larvae in the external meatus, and the former tympanic cavity was filled by a solid moving mass of larvae in a pink fluid.

Cautious rinsing with normal saline removed the larvae easily at first, but it was found that some were still present in small sinuses reaching to the posterior wall of the tympanic cavity and external meatus and these had to be removed individually by forceps. In all, 57 larvae were counted.

The ear was now clean, but the sinuses had evidently been caused by the parasites : during the next few days, pus formed again, but the sinuses closed quickly and the further course was uneventful.

Adult flies were not obtained, but the larvae were stated to be species of the genus *Lucilia*, probably *L. sericata* or *L. caesar*. The author discusses briefly

the rôle of this genus in the production of myiasis and points out that *L. caesar* lives on necrotic tissue only, while *L. sericata* attacks living healthy tissues as well (in this case, the sinuses). Both are therefore apt to cause very serious complications. *H. J. O'D. Burke-Gaffney*

CHANARIN, I. **Epitrochlear Adenopathy in the Bantu. With Pathological Reports** by C. W. HARINGTON. *South African Med. J.* 1949, Nov. 26, v. 23, No. 48, 960–62, 1 fig.

" In a series of 500 cases, clinically palpable epitrochlear lymph glands were found in 75% of native males and 54% of native females.

" The enlargement was unrelated to syphilis.

" Over 80% of the glands showed a chronic non-specific lymphadenitis and repeated minor trauma and sepsis was suggested as one of the aetiological factors.

" Three glands removed for biopsy (10%) proved to be tuberculous."

SUBRAMANIAM, R. **Symmetrical Gangrene.** *Indian Med. Gaz.* 1949, Aug., v. 84, No. 8, 334–5, 1 fig. on pl.

The author reports a case of oedema followed by gangrene of both feet, both hands, and the tip of the nose in an Indian woman of 40 whose Wassermann and Kahn reactions were positive. He is unable to make a definite diagnosis of the original cause of the condition, but excludes diabetes, ergot poisoning and Buerger's disease. The aetiology of this case may be similar to that of the patients recently described by GELFAND in Southern Rhodesia [this *Bulletin*, 1947, v. 44, 937; 1949, v. 46, 1086].

It was necessary to amputate both hands and both feet.

*Charles Wilcocks*

HISAR, R. Gidaî zehirlenmelerden Lathyrisme. Memleketimizde Anamur civarinda Fig denilen burçak danelerinin zerilliğine dair. **Toxicity of a Species of *Lathyrus* produced in Anamur.** *Türk Ijiyen ve Tecrübi Biyoloji Dergisi*. Ankara. 1949, v. 9, No. 2, 78–86. French summary 86–7.

The following is a translation of the author's summary :—

The seeds of " Fig " (a *Lathyrus* of Anamur) given orally to laboratory animals, did not produce lathyrism : but intraperitoneal injection of mice with petroleum ether extracts of the seeds produced a severe and fatal lathyrism. This resinous material did not seem to be of the nature of an alkaloid. Actually the alcoholic residue obtained by the Stas-Otto process, corresponding to 40 grammes of the seeds, produced only a weak mydriatic effect in mice. This is in line with the findings of Teilleux in 1840 with seeds of *Lathyrus cicera*.

*H. J. O'D. Burke-Gaffney*

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## ENTOMOLOGY AND INSECTICIDES: GENERAL

See also p. 194, KAHN & OFFENHAUSER, **The First Field Tests of Recorded Mosquito Sounds used for Mosquito Destruction.**

See also p. 195, KAHN & OFFENHAUSER, **The Identification of certain West African Mosquitoes by Sound.**

SHUTE, P. G. **Mosquitoes in London.** *Monthly Bull. Ministry of Health & Pub. Health Lab. Service (directed by Med. Res. Council).* 1949, Nov., v. 8, 228–31.

During the recent war, many people who slept in air-raid shelters in underground stations were troubled by mosquito bites. This was eventually found to be due to the species *Culex molestus* which was breeding, in complete darkness, in stagnant water in sumps and inverts under the platforms.

*Culex molestus* is anatomically very similar to *C. pipiens* but very different from it in its habits. Thus: *C. pipiens* breeds in daylight, the adults feed on birds and not on man and the females require a blood-meal to ripen the eggs. *C. molestus* breeds in darkness in underground collections of water, it readily bites man and it can pass through an indefinite number of generations without a blood meal. *C. molestus* usually occurs in urban areas, such as London.

*C. molestus* has been responsible for nuisances due to frequent biting once or twice in recent years in London, notably in 1921. Until the author's discovery during the recent war, however, the underground breeding habit was not known and it was not possible to find and treat the breeding sites. Where a mosquito nuisance is suspected as being due to *C. molestus* the following steps should be taken :—

(1) Capture of the offending insects, without damage, in a test tube for identification at the Malaria Laboratory, Horton, or the Natural History Museum.

(2) When *C. molestus* is present, the breeding sites must be traced. They will be within one or two hundred yards but may be as much as one hundred feet below ground level.

(3) Either drain the water away or treat it with sawdust soaked in oil. (One bushel sawdust to three gallons oil.) Also spray the walls of infested bedrooms with DDT. *J. R. Busvine*

WASICKY, R., UNTI, O. & SCHIAVI, A. Ensaios com novos larvicidas—hexacloro-benzeno, DDD, DDT e outros. [**Experiments with New Larvicides—Benzene Hexachloride, DDD, DDT and others.**] *Rev. Hig. e Saúde Pública.* 1948, Apr.–Dec., v. 6, Nos. 2, 3 & 4, 197–207.

This paper describes experiments carried out, for the most part in the laboratory but also under natural conditions, to determine the larvicidal action of a number of substances on larvae of *Culex fatigans*, *Culex* sp. and *Anopheles* sp.

The alpha and beta isomers of benzene hexachloride (BHC) exhibited no larvicidal action and the delta isomer but little. The gamma isomer, on the other hand, was remarkably effective : ten times more potent as a larvicide than DDT, and ten times less toxic for fish and freshwater animalcules.

DDD, a by-product in the manufacture of DDT, exhibited larvicidal activity closely comparable to that of DDT.

Hexaethyl-tetra phosphate (HETP), used in Germay during the war as an insecticide, is of no practical value as a larvicide.

The gamma isomer of BHC is destined to replace DDT as a larvicide by virtue of its greater toxicity for mosquito larvae and its innocuity for man, domestic animals and plants. It should be of value in the control of breeding of yellow fever vector species. *Norman White*

SENEVET, G., MANDOUL, R. & JACQUEMIN, P. Sur une forme aberrante de l'*Aedes caspius* Pallas. [**An Aberrant Form of *Aëdes caspius* Pallas.**] *Arch. Inst. Pasteur d'Algérie.* 1949, Sept., v. 27, No. 3, 277–80, 2 figs.

SMITH, G. F. & GEIB, A. F. **Control of *Aëdes* Mosquitoes by Direct Introduction of DDT into Irrigation Waters.** *J. Econom. Entom.* 1949, Oct., v. 42, No. 5, 835–6.

Irrigation on a large scale on certain farms results in widespread breeding of nuisance mosquitoes, especially *Aëdes dorsalis* and *Aëdes nigromaculis*. The water is pumped from wells at the rate of about 1,500 gallons per minute. A fifty-five gallon steel drum is set up near the source and a DDT emulsion concentrate is allowed to run into the water stream to give a DDT concentration of 0·15 ppm. At this rate, the drum empties in about twenty-six hours. The emulsion concentrate must be one which will give spontaneous emulsification into very small droplets, so that the DDT becomes widely dispersed in the flood water ; also the emulsion must not be affected by minerals so as to become a hard soap curd and it must not " cream " or sink to the bottom for at least thirty-six to forty-eight hours.

This treatment completely suppresses mosquito breeding, but gives no residual action, and breeding rapidly recommences if the treatment ceases.

*J. R. Busvine*

VAN SOMEREN, E. C. C. **Ethiopian Culicidae—*Eretmapodites* Theobald : Description of Four New Species of the *chrysogaster* Group with Notes on the Five Known Species of this Group.** *Proc. Roy. Entom. Soc. of London.* Ser. B. 1949, Aug. 15, v. 18, Pts. 7/8, 119–29, 5 figs.

PARROT, L. Quelques notes sur les simulidés d'Algérie. [**Notes on Algerian Simulidae.**] *Arch. Inst. Pasteur d'Algérie.* 1949, Sept., v. 27, No. 3, 273–6.

None of the local species is known to attack man.

KIRK, R. & LEWIS, D. J. **The Susceptibility of *Phlebotomus* Species to DDT.** *J. Trop. Med. & Hyg.* 1949, Nov., v. 52, No. 11, 223–5.

In 1942, feeding experiments with wild-caught sandflies (*P. clydei* and *P. orientalis*) were carried out in improvised field laboratories ; the flies lived four to fourteen days, after a single blood meal, in tubes $2 \times \frac{3}{8}$ in. with the mouth covered with a single layer of sandfly netting, at 27°C. and relative humidity 90 per cent. In 1947, similar experiments were carried out in laboratories of the Agricultural Research Station, Wad Medani, Sudan, with *P. clydei* and *P. papatasi*. Sandflies were collected from traps over a mile away before sunrise, allowed to feed and kept under similar conditions to those in 1942. However, 95 per cent. of the flies died within 72 hours. After overhaul of techniques flies continued to die irregularly. Other insects maintained in the laboratories remained healthy, including specimens of *Leptocimex boneti* and a colony of *Aëdes aegypti*. The authors concluded that the deaths were due to minute particles of DDT carried in the air. This conclusion was based on the fact that large quantities of DDT were stored and diluted at the Research Station, and that difficulties were encountered in maintaining a colony of *Aëdes aegypti* after the introduction of DDT to the station.

The sandfly tubes were washed with xylol, then with soap and water and all work was removed to a laboratory three miles distant. No difficulty was encountered in keeping flies alive for periods comparable to those of 1942, although the flies were still collected from the same traps in the same place as before.

Since the *Leptocimex* kept in the same incubator as the poisoned sandflies remained healthy, it appeared that *Phlebotomus* are more susceptible to DDT than other insects. Reports from the Sudan, Palestine and Peru all show that DDT can control *Phlebotomus*, and it thus appears that DDT may be an extremely potent agent against this species.

*T. E. Fletcher*

MADDEN, A. H., LINDQUIST, A. W., LONGCOY, O. M. & KNIPLING, E. F. **Control of Adult Sand Flies by Airplane Spraying with DDT.** *Florida Ent.* 1946, v. 29, No. 1, 5–10. [Summary taken from *Rev. Applied Entom.* Ser. B. 1949, Oct., v. 37, Pt. 10, 191.]

The following is substantially the authors' summary. Tests were carried out in Florida in 1945 to determine the effectiveness of spraying with DDT from an aeroplane against adults of *Culicoides*. In the treatment of a black-mangrove swamp 200 acres in extent with a 5 per cent. solution of DDT at 2 U.S. quarts per acre, a high degree of control was maintained over a period of four days, and some additional control up to two weeks after treatment was indicated. Comparable results were obtained when a similar solution was applied at the same rate over 200 acres of salt marsh and at 1 U.S. gal. per acre over an air station. The treated area of marsh was 2,000 ft. wide and served as a barrier against *Culicoides* moving towards the station. Observations on the station grounds showed that this area was completely protected for five days. It is concluded that the method shows promise.

TRAVIS, B. V. **Three Species of Flies predaceous on Mosquito Larvae.** *Proc. Entom. Soc. of Washington.* 1947, v. 49, No. 1, 20–21. [Summary taken from *Rev. Applied Entom.* Ser. B. 1949, Oct., v. 37, Pt. 10, 186.]

The Ephydrid, *Ochthera canescens*, Cress., and the Dolichopodid, *Paraclius germanus*, Parent, were observed catching and feeding on larvae of *Culex annulirostris*, Skuse, *C. fatigans*, Wied. (*quinquefasciatus*, auct.) and Chironomids on Guam and the Ephydrid, *O. brevititiolis*, Meij., was seen to feed on Anopheline and Chironomid larvae on Guadalcanal in the Solomon Islands. These flies were sufficiently numerous around isolated pools to cause a local reduction in the mosquito population, but were not abundant over a sufficiently large area to reduce the population generally. The ways in which they capture their prey are briefly described.

WIESMANN, R. & LOTMAR, R. Beobachtungen und Untersuchungen ueber den Wirkungsbereich des neuen Repellent " Kik-Geigy ". [**Experimental Observations on the Range of Activity of the New Repellent " Kik-Geigy ".**] *Acta Tropica.* Basle. 1949, v. 6, No. 4, 292–349.

[This is a long paper, almost wholly concerned with a new repellent called " Kik ", the composition of which is not stated. There are very few comparative tests with other repellents.]

Laboratory sorting tests of new repellents were done with *Stomoyxs calcitrans*, white mice being used as hosts, and with *Aëdes aegypti* and human hosts. The fourteen most efficient substances were further tested in the field (in the Argentine and in Alsace) and finally Kik was selected as the best.

Kik gives 4–10 hours' protection against the bites of various mosquitoes and it is also effective against the following: *Tabanus bromius, Haematopota pluvialis, Ctenocephalides felis, Cimex lectularius, Ixodes ricinus* (young larvae). Its repellency was moderate to poor against the following: *Anopheles quadrimaculatus, Musca domestica, Stomoxys calcitrans, Glossina palpalis, Pediculus humanus humanus* and *Rhodnius prolixus*. Against some of these insects " Kik " has action at a distance due to an effect of its vapour.

Some tests with the flies *Musca domestica* and *Stomoxys calcitrans* in which antennae or tarsi were amputated, did not elucidate the exact locus of the sense organs affected by the repellent.

That insect senses are complex is shown by the following experiments :—

(1) Normal houseflies landing on a hand coated with sugar solution begin at once to suck it up. Flies with antennae amputated begin cleaning movements instead. This is interpreted as a sensation of imperfect sense perception experienced by the mutilated flies (which they instinctively ascribe to contaminated sense organs).

(2) Normal *Stomoxys calcitrans* will usually fly towards a flask containing warm water and attempt to probe with their probosces. Flies with amputated antennae do not distinguish warm surfaces from cold. If they alight on a warm surface they do not probe, but make cleaning movements (for the reasons ascribed to *Musca*). On the other hand, hungry *Stomoxys* even with amputated antennae, will extend their probosces and suck up sugar-water. Thus the proboscis extension is induced by heat only when antennae are present, but the stimulus of sugar solution may be perceived by other means (perhaps in the tarsi). *J. R. Busvine*

Smith, C. N., Cole, M. M., Jones, E. A. & Clark, J. C. **Investigations of Tick Repellents at Camp Bullis, Texas, 1948.** *J. Econom. Entom.* 1949, Oct., v. 42, No. 5, 716–20.

Nineteen substances which had shown promise as repellents in laboratory tests (against mosquitoes, mites or lice) were tested in the field in Texas against the lone star tick *Amblyomma americanum*. Uniforms treated with the various substances were worn by soldiers who sat or lay about on the ground in an infested area for four hours per day ; every 30 to 60 minutes the men were moved to a new site. All the men were cautioned not to pick the ticks off themselves and at the end of the exposure they undressed and were examined with care. The controls (untreated uniforms) usually collected a minimum of 25 ticks. Protection was expressed, in each case, as a percentage of the average numbers of ticks on the controls.

The repellents were applied at the rate of two gm./sq. ft. either from acetone solution or from an emulsion (by ionic exchange). Impregnations from acetone usually gave slightly better results.

Most of the 19 materials tested gave good results ; worn intermittently for three to six weeks, the treated uniforms gave over 90 per cent. protection. The best substances were (*a*) Indalone, (*b*) N-butyl acetanilide, (*c*) 2-[2-(2-ethyl hexyloxy)ethoxy] ethanol, (*d*) hendecanoic acid, (*e*) hexyl mandelate, and (*f*) diethyl-phthalate. All of these are safe for use on uniforms but (*b*) (*c*) and (*d*) are reported to have caused irritation when used directly on the skin. [See also this *Bulletin*, 1946, v. 43, 1198 ; 1949, v. 46, 95.]

*J. R. Busvine*

## REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

Colonial Office. **African Labour Efficiency Survey** [Edited by C. H. Northcott, Director]. Colonial Research Publications No. 3. 123 pp. 1949. London : H.M. Stationery Office. [2*s*.]

A team led by Dr. C. H. Northcott has surveyed the social and economic conditions of 6,000 Africans employed by the Kenya and Uganda Railway and concentrated in Nairobi. It is made clear that, in the time available (six months), no adequate conclusions could be reached on all aspects of the subject. The report paves the way for further study.

Mention is made of overcrowding and other factors within the reserves that impel the African to seek employment in urban life. Though the change brings him to a new world, illustrations indicate proficiency when he is well trained and adequately supervised.

In a study of incentives likely to promote efficiency, the wage plan plus emoluments and amenities are given detailed examination. Minimal basic rates of pay are considered reasonable, but the report suggests that rates paid for skill above the minimum are insufficient to maintain efficiency and continuous service.

The vast majority of employees are housed in two locations built by the Railway, and the administration is given credit for the quality of accommodation provided. But so heavily is this accommodation taxed that a large proportion of the men are unable to have their wives and families living with them. The following comment is made, " . . . it is safe to conclude that contentment in work . . . and, therefore, workroom efficiency, would be increased if the African Railway employee could, to a much greater extent, live as a social and family unit ".

The section dealing with the medical aspects of the subject is based on the examination of 500 persons and on the personal experiences of the author. Dr. H. C. TROWELL observes that, although the usual diseases of temperate climates are to be expected, the dominant cause of ill-health and inefficiency among Africans of this community would be helminthic infections and malnutrition, including anaemia. It is noted, however, that the effects of helminthiasis are declining and that the worm load is generally lighter than in past years.

The form of malnutrition through which many Africans have to pass is referred to as malignant malnutrition or kwashiokor, and is described at length. Pelvic deformities plus maternal malnutrition during pregnancy often mean an initial handicap. Thereafter, breast-feeding, continued perhaps for years at the expense of other foods, results in grave under-nourishment. " These underfed babies fail to put on weight, their hair ceases to be black and curly, becoming brown, straight and soft. The skin also becomes pale, and the disease can therefore be easily recognised. . . . " Organic changes are described, the outcome being irreversible in later years. Persons so affected are apathetic and ineffective.

Vitamin A deficiency, as judged by Bitot's spots, was revealed in 3 per cent. of those examined, and in 20 per cent. when the skin was tested for follicular keratosis. Riboflavin deficiency was apparent in 4 per cent. There is no suggestion that these findings were responsible for impaired efficiency.

Of signs possibly representing the after-effects of malnutrition, Dr. TROWELL writes, " The hair of the African is black in colour, coarse and wiry in texture. In badly nourished persons a loss of wiriness and a loss of pigment is evident. These changes were seen in 16 per cent. of the cases examined.... In a significant proportion of cases the skin on the lower legs becomes crackled, sometimes resembling dried, cracked, black paint, occasionally revealing itself in cracked soles. These changes in skin texture were seen in 42 per cent. of the cases examined ". Other possible signs noted were enlargement of the parotids (18 per cent.), enlargement of the liver (2 per cent.) and breast enlargement (5 per cent.).

According to recognized standards of physique and strength of dynamometer pull, a large proportion fell within the normal range as seen in Europeans, and it is suggested that the effects of disease and malnutrition, rather than normal variability, accounted for those who were below standard.

Positive evidence of events promoting inefficiency is to be found, not in the quality or quantity of meals, but in their arrangement. Free rations are

issued to employees drawing basic pay of less than 60 shillings per month, and are, of course, augmented by purchases in the open market or by provisions sent in from the reserves. Dietaries and methods of preparation have been carefully examined, and the overall picture of food values (except in one small section) is satisfactory. Moreover, tables indicate that the lower wage-earners feed just as well as those who are better paid. But attention is called to the common practice of beginning the day with little more than a " snack ". Also many men living alone seemed unable or unwilling to plan a satisfactory meal before the end of the working day. The result is hunger, and failure to satisfy it over long periods is a grave handicap to effort.

Though much of the report is conjectural, the investigators have concluded that a higher standard of efficiency could be expected if existing handicaps were removed. The most serious of these is lack of education, primary and technical. The report stresses the importance of " training within industry " by means of adequate supervision.

Another great handicap arises from malnutrition, but it is pointed out that neither balanced dietaries nor wage incentives can be effective against a basic deficiency which is irreversible in adult life.

The investigators have recorded their impression of discontent concerning wages and costs of living, and this is partly blamed for the great labour turnover so apparent among the lower wage earners. They recommend a more flexible wage plan that permits greater reward for the acquisition of skill and responsibility.

Further investigations are needed, and the report ends by suggesting how closer contact could be made between employees and the administration.

*G. M. Hargreaves*

South Africa, Union of: **Annual Report of the Department of Health for Year ended 30th June, 1947** [Gale, G. W., Secretary for Health]. 85 pp., 2 charts. 1949. Pretoria: Govt. Printer.

A few years ago there was appointed in South Africa a Commission whose duty it was to enquire into the possibility of providing an organized national health service for all sections of the people of the Union; this Commission issued its report in 1944, and embodied in it proposals for the organization of a health service which included suggestions not only for general policies and schemes but also for the detailed implementation of those schemes. The Public Health Amendment Act of 1946 was largely influenced by the proposals of this Commission, and many of the suggestions have been embodied in it. The Department of Health is now concerned not only with public health in its old meaning, but also with the whole range of personal health services. In the new scheme the Health Centres are intended to be the foundation of the whole service, and some have now been instituted. The divisions into which the energies of the service are to be classified are the Promotive, Preventive, Curative and Rehabilitative services. In the present report a short description is given of these branches and of the whole structure as it is at present and as it is intended to become. It is not possible in a review to do justice to this service, and those who are interested in these trends of medical thought should consult the original, bearing in mind that the plans have been conceived for a country inhabited by peoples of widely different racial and cultural backgrounds.

The remainder of the report contains much information on the state of health of the people. For Europeans the standard is high, but for Asiatics, Coloured people and Africans the standards are progressively lower, especially for those who live and work in or near the towns. Malnutrition has been evident

in some areas, partly because there have been shortages of food (largely the result of an increase in consumption), and partly because the African who leaves his tribal life for work in the towns subsists too largely on white bread, tea and sugar, in place of the whole maize, milk, vegetables and meat of his former healthy existence. [Papers which have appeared in the medical press in former years have emphasized these points, and have also drawn attention to the fact that areas which once produced food have been deforested and almost ruined by bad farming and overgrazing, partly the result of the drain of young men to the industrial centres, and consequent inevitable overworking of the women left behind with their families.]

The report makes it clear that the housing situation in the towns is bad. Slums exist, and squatting is common, and the Africans who live under these conditions tend to suffer from the disabilities of disease and degeneration which such circumstances always engender. Efforts are being made to cope with the situation, which is largely the result of industrial development, but how far these efforts will be adequate is a matter for future experience.

The Health Centres Service comprises a centre for training at Durban, and three others at Polela, Springfield and Newlands at which, also, training is carried out. The function of a Health Centre is to study the community in which it is placed, and to promote its health by prevention and cure of disease and by all other means. At Polela 899 houses with 6,281 inhabitants were supervised during the year, at Springfield 1,249 and 5,714 respectively, and at Newlands 260 and 1,549. Some of the families are Indian or Coloured, but most are African. In addition there are 14 other Health Centres, and more are projected as time goes on. In some of the Centres records of vital statistics have been kept for a number of years. At Polela, for instance, the birth rate has risen steadily since 1943 to 43·59 per 1,000 population in 1947 ; neo-natal mortality in 1947 was 55 per 1,000 live births, and infant mortality 155 (the lowest recorded). The crude death rate was 21 per 1,000 population. Figures are available for several districts, and these will increasingly form a body of reasonably accurate information on which evaluation may be made of the trends of the health of the people. Of the diseases observed in these communities, special mention is made of tuberculosis and venereal diseases.

In the urban areas of the Union as a whole, tuberculosis presents a most serious problem for the Africans, but in the rural areas it is less serious at present, though the incidence may grow as more diseased persons return to their villages from the industrial centres. In the towns the Africans show the rapidly fatal type of disease which has long been associated with them, but in the country the type more closely simulates that to which Europeans are subject, and which is less progressive. An outline is given of the general measures necessary to cope with tuberculosis ; it deals chiefly with such subjects as housing, food, and sanitation which are, of course, fundamental for the control of tuberculosis and of the other communicable diseases. A graph on page 39 shows that the death rates from tuberculosis per 100,000 are :— Europeans about 20 ; Asiatics about 230 ; Coloured about 520 ; Africans about 770 [the exact figures are not given]. These rates relate to the Asiatics, Coloured and Africans in three or four cities only ; the rates for the Union as a whole, including rural areas, are lower.

Of the other diseases, syphilis gives rise to anxiety, but treatment centres are being expanded. Leprosy and malaria are present but are not excessive. Schistosomiasis is a major problem in parts of the Union. There were 11 outbreaks of plague, but only 23 cases, though an epizootic continued up to August in rodents in the Transvaal. Smallpox was present in all provinces, and also typhus (louse-borne), though the incidence of the latter was lower than at any time since figures were collected. The deaths from typhus (32 in

626 cases) were much below the averages of several years ago. DDT, of course, is used in control of outbreaks. The incidence of poliomyelitis has declined markedly. Diphtheria still remains at too high a level, and parents do not yet make enough use of the immunization services available. An extensive outbreak of relapsing fever (tick-borne by *Ornithodorus moubata*) occurred in metal miners living in small compounds. Treatment with organic arsenical compounds was very successful, and control of the ticks was instituted by chemical means or by destroying them in their crevices with a blow lamp. Typhoid fever is endemic, especially in rural areas where water supplies are not so carefully controlled as in the towns.

Other sections of this report describe the work of the laboratories, the District Surgeons, the hospitals, the dental services, the various councils and the medical research institutions. The report is a well written and informative account of medical progress in a country of 2,335,000 Europeans, 7,757,100 Africans, 252,000 Asiatics and 903,600 Coloured persons ; for whom there are 4,802 registered medical practitioners, 824 dental practitioners, 2,907 medical students and 283 dental students on the registers of the Medical and Dental Council, and 19,689 nurses and midwives on the register of the South African Nursing Council. *Charles Wilcocks*

SERGENT, Ed. Rapport sur le fonctionnement de l'Institut Pasteur d'Algérie en 1948. [**Annual Report of the Pasteur Institute of Algeria for 1948.**] *Arch. Inst. Pasteur d'Algérie.* 1949, June, v. 27, No. 2, 170–209. [Numerous refs.]

A great deal of interesting information contained in this Report does not lend itself to summary, but attention can be drawn to a few points of special interest.

Since 1934 a widespread vaccination with BCG has been undertaken in many parts of Algeria. The practice is to vaccinate and revaccinate every three years all children in good health below the age of 15, by cutaneous scarification. The vaccine contains 7·5 cgm. of bacilli per cc. No tuberculin skin reaction tests are used. It is now generally agreed that BCG is innocuous, and experience has shown that this innocuity extends to persons already infected with tuberculosis. Calmette's insistence, in the early days of BCG vaccination, on the necessity of obtaining, in all but the newly born, two negative tuberculin skin reactions in succession before vaccine be undertaken was to avoid the risk that tuberculous infection already present might be ascribed to the BCG. Collective BCG vaccinations are now as easy to organize as smallpox vaccinations.

Since 1936, 4,057 reports have been received from doctors concerning the treatment of scorpion stings with antiscorpion serum : 1,003 of these were cases in which the symptoms appeared to be alarming or even desperate. Ninety-two per cent. of these patients with alarming symptoms were saved by the serum. Treatment too long delayed or too small a dose of serum was responsible for most of the failures.

DDT has been found to be very toxic for mice and rats. Sprinkling a powder containing 5 per cent. DDT in mouse-holes and in the orifices of rat burrows is an effective way of controlling these pests. DDT may also be used with success against scorpions, in particular against the most dangerous of all North African species, *Prionurus australis*, for which DDT in powder form is very toxic. A barrier of DDT powder should be laid between the " hide-out " of the scorpions and the place where one passes the night, generally along the foot of the wall of the bed-chamber. *Norman White*

GUYANE FRANÇAISE & ININI. Rapport sur le fonctionnement technique de l'Institut Pasteur de la Guyane Française et du Territoire de l'Inini pendant l'année 1947 [CAMAIN, R.]. [**Annual Report of the Pasteur Institute for 1947.**] Publication No. 173. 101 pp. 1948. Cayenne: Imprimerie Officielle.

SHORTT, H. E. **Presidential Address.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Nov., v. 43, No. 3, 239–54.

The subject of this inspiring address is " Tropical Medicine as a Career ". Attention is directed to the wide scope and diversity of interest that still attract workers to the field of Tropical Medicine. The mental and scientific equipment essential for successful workers in that field are outlined. Endless fascinating problems still await solution: sprue is still a very mysterious condition; there is still much to be learnt about malaria and its parasites; knowledge of blackwater fever is very deficient; the African trypanosomiases have still many unsolved problems; more knowledge regarding the transmission of visceral leishmaniasis in many parts of the world is required; little is as yet known about toxoplasmosis; tropical mycology is one of the least explored branches of tropical medicine; the virus diseases, yellow fever and dengue, have important problems awaiting solution; the virus encephalitides call for elucidation; nutritional research is becoming ever more important; much more requires to be known with regard to the physiological functioning of the body in tropical climates.

With stories drawn from his own experience the President of the Royal Society of Tropical Medicine described the alluring prospects that still await the adventurous enthusiast who devotes his life to tropical medicine.

*Norman White*

MAEGRAITH, B. G. **The Liverpool School of Tropical Medicine.** Reprinted from *Discovery.* 1949, July, 6 pp., 5 figs.

The history of the Liverpool School of Tropical Medicine has already been referred to in this *Bulletin* [1949, v. 46, 178] in anticipation of its fiftieth anniversary. Now, on the occasion of the anniversary itself, Professor Maegraith has produced an interesting account of the School, its development and activities. Note is made of the academic amalgamation of tropical medicine and tropical hygiene in conformity with modern conceptions: it is pointed out that in the tropics the main cause of ill-health is community-wide, and this demands a knowledge and practice of preventive measures. The newer trends in entomology are also stressed: here again the School has followed the practice established in other centres of directing teaching and research towards living parasites and insects rather than by the use of preserved material; " the museum is giving place to the zoo ".

The contribution of the School to the study of malaria, its transmission and control, is traced from the early days and references are made to such distinguished workers as Ronald Ross, Stephens, Dutton and Warrington Yorke. Special tribute is paid to the achievements in chemotherapy by the last-named. The work of the School in connexion with yellow fever investigations is also mentioned.

The activities of the Sir Alfred Jones Laboratory in Freetown are described fully, together with the other many and various investigations undertaken by the School staff in West Africa and the Sudan during and between two world wars. The clinical tests of paludrine [proguanil] are referred to.

The Department of Tropical Medicine has placed a new emphasis on the physiological effects of malaria and blackwater fever and the parallel manifestations in other diseases. The well-known investigations in laboratory and field,

carried out on helminthic and insect-borne diseases are mentioned. Finally Prof. Maegraith refers to some of the many links between the School and other research and educational bodies.

The paper is illustrated with five photographs and is a pleasant and readable Jubilee publication, in addition to its more permanent value as a record of five decades of far-reaching and distinguished work. *H. J. O'D. Burke-Gaffney*

O'Dwyer, J. J. **Training for and Hygiene in the Jungle.** *J. Roy. Army Med. Corps.* 1949, Sept., v. 93, No. 3, 114–23.

Sir Sheldon Dudley (formerly Medical Director-General of the Royal Navy) wrote in a Royal Naval Bulletin :—

" No one admires more than I the efficiency of the equipment and the medical organization which the Army Doctors had devised to prevent the field diseases which have wrought such havoc in former wars. Yet the same diseases became almost as great a menace in the early years of the Japanese war; because the combatant officers had not been properly taught the value of applied hygiene as a factor in the success of military operations."

In 1943, in Burma, malaria incidence was almost as high as that attained in Salonika in the 1914–18 disastrous Macedonian campaign ; dysentery was so deplorably high that actual figures were never computed ; the feeding of British and Indian troops was so poor that many showed the grosser signs of avitaminosis and loss in weight ; a nutritionist examining British troops in Imphal found evidence of B group vitamin deficiency in proportions varying between 15 and 50 per cent. of those examined. In August 1944, in an army of half-a-million men there were 400 cases of virulent smallpox. Many medical officers of medical units, British and Indian, seemed to forget that purification of water supplies for drinking and washing was essential in the tropics ; the cynicism of some was appalling.

The author of this paper used such facts to impress on his audience the deplorable state of affairs existing in the early years of the Burma campaign. He is particularly critical of the division of opinion in those days within the senior ranks of the Army Medical Service as to the value of hygiene measures or even unit sanitary discipline ; some medical units showed a very low standard of sanitation, a very poor example to combatant units.

In later years the need for strict anti-malarial discipline in the taking of mepacrine was a controversial subject within the Army Medical Service ; Brigadier Hamilton Fairley proved to the combatant forces of the world, the Brigadiers and Generals of fighting divisions, the important commanders of military areas of bases at home and abroad, that despite the disagreement of some of the medical authorities on the value of mepacrine an answer had been found to one of our gravest problems.

In tracing the causes of lack of interest and enthusiasm and diversity of opinion the author stresses the lack of training in preventive medicine and the emphasis on curative medicine in the formative student days of the doctor. Many doctors are unable to get away from curative medicine and show a disinclination to broaden their horizon so that they should appreciate that theirs is a responsibility making it necessary for them to advise the laymen on all aspects of the soldiers' life, his work, his surroundings, his clothes, his accommodation, the employment of his leisure time, the impact of training on his mind, the relationship of the man to his N.C.O. and his officers, his morale. If the medical profession took a narrow view of its responsibilities and had in many cases little belief in the remedies and courses of action laid down for it by its own organization, courses investigated, believed in, and pronounced upon

by its own specialists, what chance had the Army as a whole of being adequately trained in hygiene and sanitation ?

In the later years of the war the medical services, by advice and example, were able to convince the combatant services of the value of preventive measures, and today, " Never has the need for health discipline and health measures been so understood and so stressed by our senior commanders—a remarkable achievement." The training of the R.A.M.C. must run parallel with that of the rest of the Army, but in its own sphere it must attain a high peak of efficiency if the Corps is to perform conscientiously its medical duties in the tropics.

[Though this paper was addressed to a military medical audience, it contains salutary reminders of the defects in medical education which become obvious under the strain of war ; even today few doctors working in the tropics have any interest in preventive medicine or environmental conditions which promote disease ; most are content to remain attendants on established illness.]

*R. Ford Tredre*

We record with the deepest regret the death, on 24th March, 1950, at the age of 78, of Sir ARTHUR BAGSHAWE, C.M.G., the first Director of the Bureau of Hygiene and Tropical Diseases.

When the Sleeping Sickness Bureau was created in 1908, he was chosen by the Secretary of State for the Colonies to organize it. As Director and chief editor he created and shaped the publications issued by the Bureau, namely the *Sleeping Sickness Bulletin* (1908–12), the *Kala Azar Bulletin* (1911–12), the *Tropical Diseases Bulletin* (1912– ), the *Tropical Veterinary Bulletin* (1912–30), the *Sanitation Supplements of the Tropical Diseases Bulletin* (1921–25), the *Bulletin of Hygiene* (1926– ) and the *Supplement* to the *Tropical Diseases Bulletin* (1931– ).

To Sir ARTHUR BAGSHAWE'S scientific vision, and his accurate habit of mind, are due the standards of abstracting which have come to be associated with these publications by readers throughout the world.

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